ARCHIVES OF DISEASE IN CHILDHOOD.

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CONTENTS

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HEART DISEASE IN CHILDREN ATTENDING SCHOOL.

BY

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One of the many problems which confronted the first school medical inspectors was that of children apparently healthy, leading normal lives, in whom murmurs and other abnormalities of the heart were revealed on medical inspection. It was known that cardiac murmurs do not necessarily indicate organic damage, but it was believed that they were departure from health of some sort, to be reckoned as defects. But of what kind and with what result we did not know. Since school medicine offered the most favourable means of watching the cardiac states of children who were not invalids, many inspectors tried by continuous and recorded observations to decide what cardiac murmurs in children really indicated and what happened to them. For this purpose the author kept a register of all cases of cardiac abnormalities discovered by inspection and endeavoured, by subsequent investigation and following up, to learn something of the nature, cause and history of these departures from the usual.

This register remained unused for many years. When the formidable question of juvenile rheumatism became dominant, the method of approaching it was found to be obscured by lack of statistical evidence even of the roughest kind on the extent and nature of the problem : and as the result of a discussion with Dr. Carey Coombs of Bristol, who was inaugurating a scheme for the control and mitigation of child rheumatism in the West of England, the existence of this register was recalled. On cursory examination it promised to throw some light upon several matters which were still uncertain.

As the register had been compiled without any preconceived idea of what use, if any, might be made of it, it was thought that it might supply a rough idea of the extent of rheumatic heart disease in children, up and about, and give some indication of the scope and nature of their needs.

The district covered was the Western part of the colliery district of Yorkshire, roughly a hundred square miles, with Wakefield as the centre. The years of observation were 1909 to 1913. In those days, rheumatic fever was not uncommon in children, and chlorosis was met with not infrequently in girls of 11-13 years.

The number of children inspected was 22,276, between the ages of three and fourteen. All these children were on the school register, but not all of them were actually attending school, some being brought forward especially for inspection. Chronic invalids who had never attended school, and some few who were too ill to move, are therefore missing from the register. The numbers of children of ages 4, 5, 7, 9, 10, 12 were approximately equal and their roll is nearly complete, but of the ages 3, 6, 8, 11, 14, the numbers are not complete.

Of these 22,276 children, 952 showed some abnormality of the heart, a proportion of 4.25 per cent.

These cases are analysed in Table 1.

TABLE 1.

ANALYSIS OF 952 CHILDREN SHOWING CARDIAC ABNORMALITIES.

Group.	Cardiac Abnormality.	3 yrs.		4 yrs.		5 yrs.		6 yrs.		7 yrs.		8 yrs.		9 yrs.		10 yrs.		11 yrs.		12 yrs.		13 yrs.		14 yrs.		Total
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Organic	Congenital He. Disease ...	1	2	5	2	8	4	—	4	1	1	1	1	—	1	1	—	—	—	1	1	—	1	—	—	35
	Active Carditis...	—	—	—	—	—	—	—	1	3	1	—	1	2	2	3	3	—	—	—	5	1	1	—	—	23
	Doubtful Act Carditis ...	—	2	8	1	14	5	1	3	9	2	2	2	3	2	6	4	1	—	11	13	1	—	1	1	91
	Established Organic Dis. ...	1	1	—	1	2	2	2	3	7	3	1	1	—	1	4	5	2	2	11	8	3	2	—	—	63
	Total	2	5	13	4	24	11	3	11	20	7	4	5	5	6	14	12	3	2	23	27	5	4	1	1	212
Non-Organic	Functional ...	28	5	116	25	101	59	27	16	37	27	11	5	4	6	22	5	—	3	18	35	7	5	—	—	562
	Hæmic ...	5	2	7	3	22	19	7	8	8	11	1	2	1	8	6	6	—	2	1	11	—	6	—	—	136
	Total	33	7	123	28	123	78	34	24	45	38	12	7	5	14	28	11	—	5	19	46	7	11	—	—	698
Curiosities	Total	3	2	6	4	7	1	—	2	—	—	—	—	1	1	1	1	—	—	3	8	1	1	—	—	42

I. ORGANIC GROUP.

Congenital Heart Disease.

35 cases of congenital heart disease were met with. In most cases the diagnosis of congenital heart disease is scarcely likely to be erroneous.* That the proportion of children with congenital heart disease should steadily diminish is, of course, to be expected, as the condition does not arise afresh and there is considerable elimination by death. To determine the precise nature of congenital disease is always difficult, and frequently impossible, but for practical purposes these congenital heart lesions are divided into two classes; those causing severe interference with the circulation and a life of chronic invalidity followed by early death, and those which apparently interfere little, or not at all, with a life of activity.

In the original count, 23 cases were registered as unquestionably congenital disease of the heart; of these, 16 were severe, of which two died, and seven were trivial.

Of 12 doubtful cases, two can be struck out as being temporary murmurs of no consequence; two were undoubtedly severe congenital disease; two were undoubted congenital disease not severe; one was severe disease, doubtfully congenital; and five mild disease, doubtfully congenital.

Acquired Organic Heart Disease.

86 cases were diagnosed as organic heart disease upon first inspection These cases fall naturally into two divisions—established heart disease and active carditis. Of the 86 cases, 63 were cases of established heart disease, all either valvular or partly valvular. Of these, 35 had a known history of acute rheumatism or chorea, one of nephritis and two of scarlet fever. Not all of these chronic heart cases could be considered as cripples. Three of the children

*Though it is not unlikely that some of the cases in other categories may be congenital disease.

died under observation; 15 of them were more or less chronic invalids, or became so at puberty; 45 entered puberty apparently equal in their general health and activity to normal children and, while under observation, had no recurrence of rheumatism or interference with compensation. From the point of view of preventive medicine, these established heart cases are of little interest compared with the next group, the cases of active carditis.

Only 23 cases were definitely diagnosed as active carditis on first inspection, but to these must be added an equally important group of children first registered as doubtfully organic.

Of the cases registered as definite acute carditis, 13 were suffering from active chorea and 10 from other forms of rheumatism. One died; 13 developed into permanent heart disease; five cleared up; and four were either lost sight of, or not followed sufficiently long.

There were 91 doubtful cases. Of these, three were post-diphtheritic hearts. The others were all probably cases of acute carditis. Of these, eight were known to date from rheumatic fever, seven from scarlet fever, six from chorea and seven from acute nephritis. The origin of the remainder is obscure. Of these 91 cases, 53 were left with permanent organic heart disease, 22 remained doubtful at the end of the observation and 16 recovered.

Since active carditis in children is one of the most important of the problems of health, it will be as well to go into the subject somewhat fully in the light of the evidence which was gathered. For this purpose it will be as well to lump together the cases which were diagnosed definitely at once and those in which a judgment was either suspended or could not be made at all. We find then that amongst 22,250 children actually attending school, 114, or roughly 1 in 200, were suffering from active, more or less acute, inflammation of the heart. The liability to this condition varies considerably with the age of the child. Bearing in mind what was said in the opening paragraphs, we are only entitled to use the ages 4, 5, 7, 9, 10 and 12, even for the roughest statistical purposes. The occurrence of endocarditis was at the following proportionate rates:—

9	at	4	years.
19	at	5	,,
15	at	7	,,
9	at	9	,,
16	at	10	,,
29	at	12	,,

We find also that of those cases in which a diagnosis of acute carditis could be made, or in which it was suspected (excluding 26 cases in which the result is uncertain, leaving 88 in which the result is known) 68, or more than three-quarters, developed into permanent heart disease. The history and associated conditions of these cases is worth consideration as throwing some light on their ætiology, and also demonstrating how really grave disease can be present in children presumed to be normal and living a normal child life.

Excluding cases in which there is the least doubt, or exhibiting signs or symptoms the significance of which could not be determined with accuracy, we found that at the time of the first examination :—

10 were suffering from active rheumatism and eight had a history of recent rheumatism.

13 were suffering from active chorea and six were recovering from recent chorea.

7 were recovering from recent scarlet fever.

7 were suffering from active nephritis.*

3 were suffering from chlorosis.†

II. Non-Organic Group.

In the course of inspection and in general medical work, numbers of cases are met with in which murmurs are present, in which there is no serious damage to the heart. These murmurs are, however, of importance, because of their frequency, and because those who possess them are liable to be treated as though they had heart disease and to have their activity seriously curtailed. In the register these cases were divided into two classes, " hæmic " and " functional." At the present time this distinction seems rather trivial, but the history of the distinction is of some interest. In the nineteenth century it was well known that a large number of patients had heart murmurs which were not significant of organic disease Such murmurs were met with in cases of chlorosis and very frequently in children suffering from various chronic or acute diseases. They were generally considered to be due to some alteration in the state of the blood and were consequently called " hæmic murmurs." Though it was recognized that these murmurs were not significant of permanent damage to the heart, they were considered as of some consequence and calling for treatment.

When the medical inspection of school children commenced, it was found that children not obviously ill frequently showed cardiac murmurs. As, at that period, these murmurs were looked upon as a sign of disease, they were recorded and included amongst cases of organic disease. But it became obvious that the majority of these murmurs could not be significant of disease at all, for they occurred frequently in children who were absolutely healthy, whose hearts showed no other sign or symptom of departure from health, and the murmurs themselves were temporary and variable. In the register, non-organic murmurs were therefore divided into two classes : those present in children who were absolutely healthy were called " functional " : and those present in children who were weakly, sickly, suffering from ill-nutrition, anæmia or various morbid conditions, were called " hæmic."

---

*There is strong reason to suspect that acute nephritis in childhood is a rheumatic infection. The facts that by far the commonest of all causes of nephritis in childhood is scarlet fever ; that the nephritis of scarlet fever is closely connected with post-scarlatinal rheumatism ; that there is no significant difference between post-scarlatinal rheumatism and rheumatism which is not post-scarlatinal, and the present fact that some 7 per cent. of cases showing acute endocarditis eventually ending in chronic heart disease are, at the time, suffering from acute nephritis, go some way to prove this contention.

†At the time these observations were made, chlorosis was not uncommon in girls of 12 in the district worked.

TABLE 2.

ANALYSIS OF CASES SHOWING FUNCTIONAL MURMURS.

Age	3	4	5	6	7	8	9	10	11	12	13	14	Total
No. of Cases	33	141	160	43	64	16	10	27	3	53	12	—	562
Cleared in 6 months ...	11	42	59	19	22	4	1	9	3	13	1	—	184
,, ,, 12 ,, ...	4	11	16	6	12	2	3	3	—	2	—	—	59
,, ,, 18 ,, ...	3	5	1	1	4	1	1	2	—	—	—	—	18
,, ,, 24 ,, ...	1	6	6	2	4	—	—	3	—	—	—	—	22
,, ,, 30 ,, ...	—	1	—	—	—	—	—	1	—	—	—	—	2
,, ,, 42 ,, ...	—	—	—	—	1	—	—	—	—	—	—	—	1
Total known to be cleared ...	19	65	82	28	43	7	5	18	3	15	1	—	286
Not cleared in 6 months ...	4	22	33	7	2	—	1	—	—	4	—	—	73
,, ,, ,, 12 ,, ...	—	9	10	1	6	1	—	—	—	1	—	—	28
,, ,, ,, 18 ,, ...	—	10	8	1	3	1	—	1	—	2	—	—	26
,, ,, ,, 24 ,, ...	3	7	4	1	2	—	1	1	—	—	—	—	19
,, ,, ,, 30 ,, ...	—	2	—	—	—	—	—	1	—	—	—	—	3
Total not cleared during time of observation	7	50	55	10	13	2	2	3	—	7	—	—	149
Developed organic heart disease	1	3	—	1	1	—	1	—	—	—	—	—	7
Remainded doubtful, functional or organic ...	—	2	1	1	3	—	—	1	—	—	1	—	9
Died	—	1	—	—	—	—	—	—	—	—	1	—	2
Lost sight of or not followed	6	20	22	3	4	7	2	5	—	31	9	—	109

Group with Functional Murmurs.

A glance at Table 2 will show the most important facts in connection with the functional murmurs. They are frequent in young children, dwindle during the middle school period, and again become somewhat more frequent at twelve years of age, particularly in girls in whom puberty is commencing. Their age distribution is therefore entirely different from that of endocarditis, suggesting that they are temporary in character and tend to disappear about the time of the second dentition. The follow-up of these cases proves that they are, in the majority of cases, temporary peculiarities of children during the first dentition period.

562 such cases were registered, and the majority of them were followed up to the point when the heart sounds became, and remained, normal. The length of time that these murmurs existed could not be told for certain, but it could be told how long they lasted after they had been detected.

Of these cases (453 in number) which were followed up for a sufficient length of time for conclusions to be valuable, we get the following :—

Children aged 3.—27 cases followed. 11 had become normal in 6 months : 4 in 12 months ; 3 in 18 months ; 1 in 24 months ; 4 were still present after 6 months ; 3 were still present after 24 months and 1 developed permanent organic disease.

Children aged 4.—121 cases followed. 42 cleared in 6 months ; 11 in 12 months ; 5 in 18 months ; 6 in 24 months ; 1 in 30 months ; 22 had not cleared in 6 months ; 9 had not cleared in 12 months ; 10 had not cleared in 18 months ; 7 had not cleared in 24 months ; 2 had not cleared in 30 months. 1 died. In 2 the diagnosis remained doubtful to the end, and in 3 the diagnosis was altered to organic disease, or they developed organic disease while they were being watched.

Children aged 5.—138 cases followed. 59 cleared in 6 months ; 16 in 12 months ; 1 in 18 months ; 6 in 24 months ; 33 had not cleared in 6 months ; 10 had not cleared in 12 months ; 8 had not cleared in 18 months ; 4 had not cleared in 24 months. In 1 the diagnosis remained doubtful.

Children over 5.—After the age of five years, the tendency is for these murmurs to clear more rapidly.

Of the total 453 at all ages, 184 were clear in 6 months, 243 in 12 months, 261 in 18 months, 283 in 24 months, 285 in 30 months and 286 in 42 months ; leaving 167 which had not cleared at the time the observations ceased. But of these 167, 73 had only been watched for 6 months and 28 had only been watched for 12 months. Amongst the 453 cases, 2 died of intercurrent diseases, 7 were eventually diagnosed as organic disease, and in 9 others the question remained doubtful at the end whether the condition was organic or not. If we take only the more certain cases that were re-diagnosed as organic, namely, 7 out of 453, we see this is roughly 1·5 per cent., whereas the average chance of a child developing organic disease is under one per cent. ; so it is possible either that these children with functional murmurs are slightly more liable to carditis than children with normal heart sounds, or that there is a slight error in considering as functional, murmurs which are really organic. It is worth noting that this error is small.

TABLE 3.

Analysis of 136 Cases Showing Hæmic Murmurs.

	Number	Not followed	Cleared	Not cleared up while under observation	Became organic	Died
Ill-nutrition, etc. ...	71	26	26	17	2	—
Tuberculosis	17	2	8	7	—	—
Diphtheria	3	—	3	—	—	—
Chlorosis	2	—	1	1	—	—
Chorea	2	—	1	—	1	—
Other conditions ...	38	17	10	10	1	—
Totals	133	45	49	35	4	—

Since we had the division of these non-organic murmurs into " functional " and " hæmic," it naturally follows that the present condition of the functional class was that of health, but when we consider their past history, we find that of the total 558, 4 had a history of rheumatism, 4 a history of pneumonia, 4 a history of scarlet fever and 2 a history of chorea ; and we find, what is most remarkable, that all four who had a history of rheumatism, and one of those

who had a history of chorea, became "organic" and that the other with a history of chorea, died. When the history of these functional cases is compared with that of the endocarditis cases, the difference between them is striking. As generally nothing was known of these murmurs before they were discovered, there is no evidence whether they arose spontaneously, or whether they were present from birth, but in five cases it is known that murmurs were not present some time before they were detected, and in six other cases the murmurs disappeared for a time and then came back again.

Group with Hæmic Murmurs.

As it has been explained, a distinction was drawn between "functional" and "hæmic" murmurs, the former being those murmurs present in healthy children and the latter those present in cases showing signs of ill-health.

Of the 136 cases registered as hæmic, 71 were suffering from various degrees of ill-nutrition, semi-starvation or anæmia. Of these, 21 cleared in 6 months, 4 in 12 months, 1 in 24 months ; 8 were not cleared in 6 months, 2 not cleared in 12 months, 5 not cleared in 18 months, and 2 not cleared in 24 months. One developed scarlet fever and subsequently organic heart disease and in 1 case the diagnosis was altered to organic disease. The result in 26 cases is unknown.

17 were suffering from tuberculosis and the remainder from various conditions. It is to be noted though, that only two either suffered from, or had a history of, chorea and only one of nephritis.

From the consideration of these two groups, the functional and the hæmic, it would certainly appear that the distinction is trivial and that there is no need to classify cardiac murmurs which are not organic.

III. Group of Cardiac Curiosities.

There were 42 curiosities ; 2 were transpositions, 2 displacements and 3 exocardial scratches. The remainder were curiosities of rhythm. These fall into two groups. The most abundant occur in young children. The normal rhythm of the young children is irregular, and the 22 cases recorded had extraordinary exaggerations of arrhythmia. They all became regular as they grew older. At the other end of the school age one meets with arrhythmia in boys over twelve, generally as the result of smoking, and arrhythmia in girls, generally at the beginning of menstruation.

Discussion.

From other registers compiled during school inspection, it was found that the proportion of cases showing abnormal heart condition was 36 per 1,000 (based on the examination of 25,000 children). This proportion is slightly less than in the heart register, which gives 42·5 per 1,000, but the districts covered were not the same, and some of the cases (the curiosities) included in the heart register would not have appeared in the other.

Of 500 cases of adenoids for which operative treatment was advisable, 477 had normal hearts, 17 had functional murmurs and 6 had organic heart disease. From which we can conclude that there is no significant relationship

between adenoids and heart conditions. Perhaps we may be allowed to extend this statement into saying that the antecedent causes of the adenoid condition and those of cardiac disorders are not similar.

Among 579 cases of rickets in school children, 32 had heart murmurs, none of which was organic. This gives a rate of about 56 per 1,000. Considering that the rickets children are a younger class than 'all' school children, there would appear to be no significant relationship between rickets and heart conditions.

Conclusions.

Presuming that the colliery district of Yorkshire is a fair sample of England and that the conditions present before the War are similar to those ruling to-day, we are justified in forming the following conclusions :—

1. The abnormal conditions of the heart discovered in elementary school children actually on the school register are of three kinds : permanent organic heart disease, active carditis and functional murmurs. That the first class may be considered as cripples ; the last class may be neglected as of no consequence ; and that the middle class, or carditis cases, call for active and special treatment which offers some promise of cure.

2. That the proportion of children that can be expected to exhibit functional murmurs is about 28 per 1,000, permanent organic disease about 3·0 per 1,000 and active carditis about 5·0 per 1,000. Taking it that two-thirds of the last will end in permanent heart disease, it may be concluded that 6·4 per 1,000, or one child in 160, reaches the age of fourteen years with a permanently crippled heart.

3. That it would appear that, excluding congenital heart disease, there is one cause, and one cause only, of permanent heart disease in children, namely. rheumatism, assuming, as seems probable, that chorea, post-scarlatinal rheumatism and acute nephritis in childhood are rheumatic affections.

4. That the most important work of the school medical inspector in connection with the hearts of school children. is to recognize active carditis. School inspection should be an inspection and not a detailed examination, so that diagnosis is not one of its functions. The school inspector's work ends when he has found evidence to raise his suspicion. In connection with these heart conditions of children, the school inspector, while inspecting, must not be expected to make a definite diagnosis of carditis, but he should be expected to refer for complete and detailed examination, every case in which the suspicion of carditis has been aroused during his inspection.

A CASE OF LEONTIASIS OSSEA (DIFFUSE OSTEITIC FORM).

BY

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Two forms of leontiasis ossea are described by Lawford Knaggs [6, 7], namely, a creeping periostitic variety, and a diffuse osteitic variety. The latter would appear to be very rare, and for this reason the details of a case recently observed by myself and my colleagues are now recorded.

V. C., male, aged 14 years. The parents, and five brothers and sisters are all normal. The patient was born at a full-term, normal labour; 'he seemed a normal infant.' When six years of age he fell from the back of a cart and struck his head on the road.

The present illness began about two years ago, with frontal headache and deformity of the head. There was no vomiting, and no mental changes were noted. Recently, however, there is some evidence of slight moral deterioration (small thefts); and he has had a few "fainting" attacks in the morning.

He seems an alert, intelligent and nervous boy. Routine clinical examination shows no abnormality or disease of the trunk or limbs.

The patient's head is deformed (Fig. 1 to 4) especially in the frontal region, and particularly on the left side, where there is considerable protrusion. The left orbit is displaced forwards,

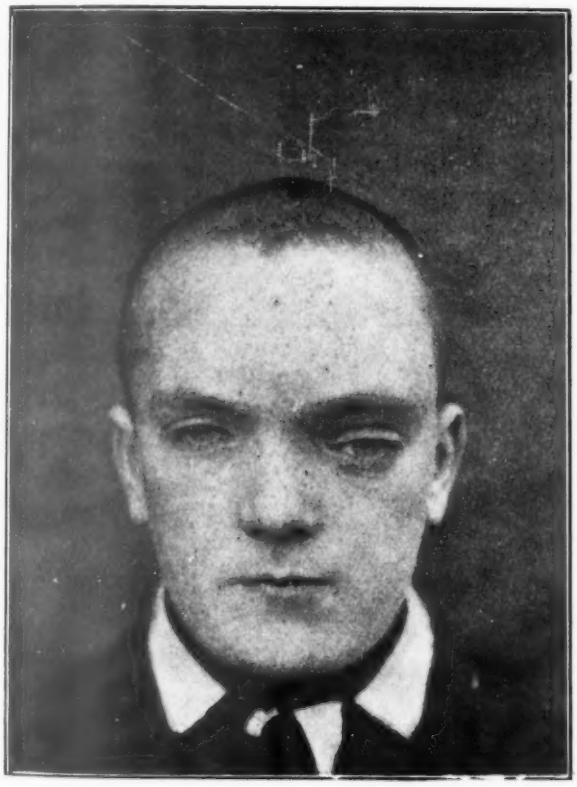

FIG. 1

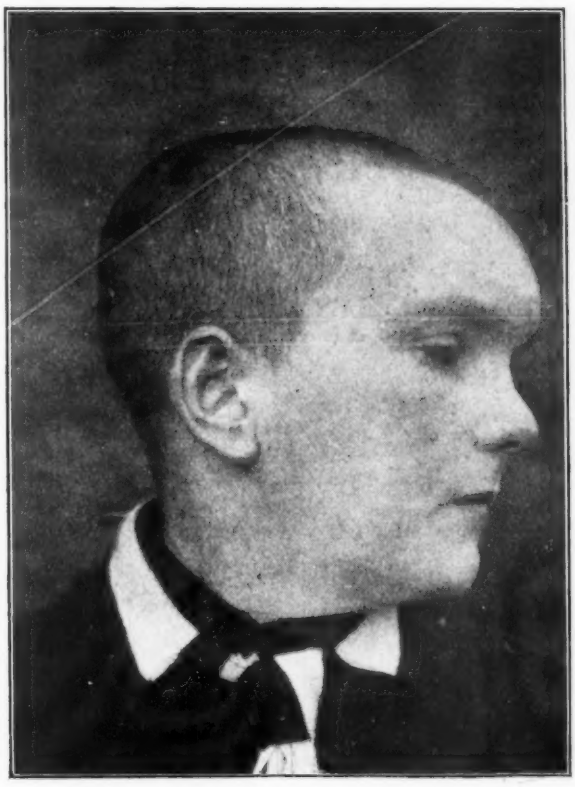

FIG. 2

outwards and downwards; the distance between the inner canthi is $1\frac{1}{2}$ in. The cranial bones feel uniformly and normally dense; there is no tenderness, and no change in the skin and subcutaneous tissues overlying the cranium. The maximum occipito-frontal circumference of the head is $22\frac{3}{8}$ in.

1. *X-Ray Examination.* (*Dr. J. H. Mather.*)

A. The Skull: lateral view (Fig. 5 and 6). The surface of the skull shows a definite bulge in the frontal region. This is seen to be due to a bony thickening of the frontal bone, most marked in the supraorbital region but also involving the nasal process of the frontal bone and the orbital plate. The thickened bone shows a fairly homogeneous texture, with a few irregular more translucent areas in the diploë. Its contour is smooth. The frontal sinuses are obliterated, and the sagittal diameter of the cranial cavity diminished.

The sphenoidal sinus shows some slight loss of translucency and its floor appears to be thicker than normal. The shape of the pituitary fossa is not abnormal.

The posterior portion of the skull is not involved; the sutures are not obliterated and the vascular grooves show normal appearances. No digital markings are to be seen in any part of the calvarium.

B. The Skull: anterior view (Fig. 7). The skull shows a definite asymmetry. The transverse diameter of the cranium is increased, the right temporo-parietal region showing a distinct bulge. This is possibly compensatory to the diminution in the sagittal diameter.

The frontal bone shows an increase in opacity, more marked on the left side. The obliteration of the frontal sinuses is again seen, but in addition there is now evident a diminution in size of the left orbital cavity, due to encroachment by the thickened bones forming its roof, inner

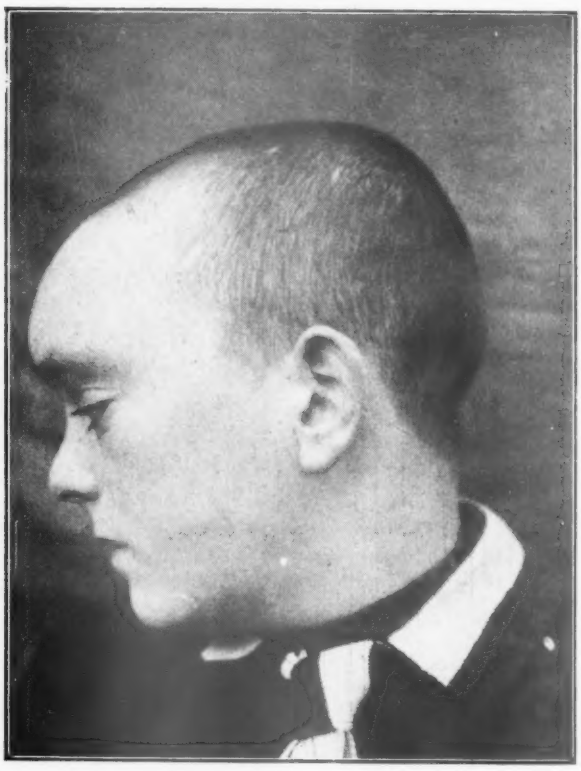

FIG. 3

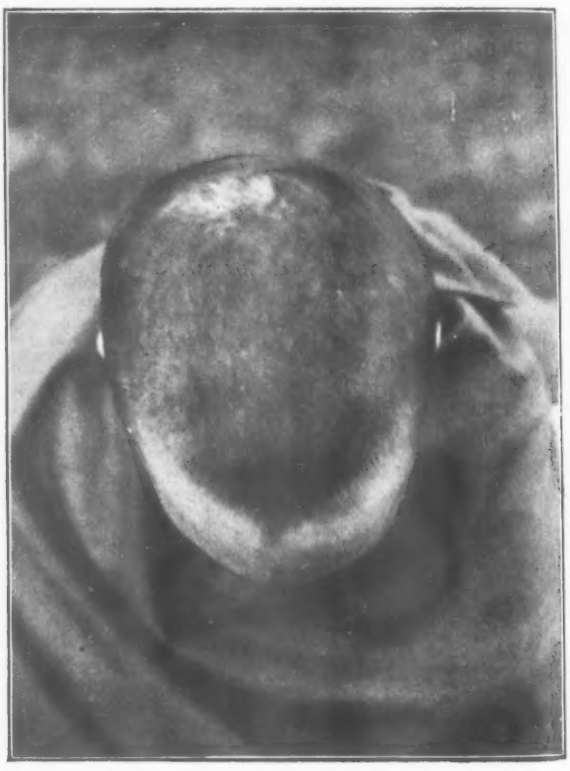

FIG. 4

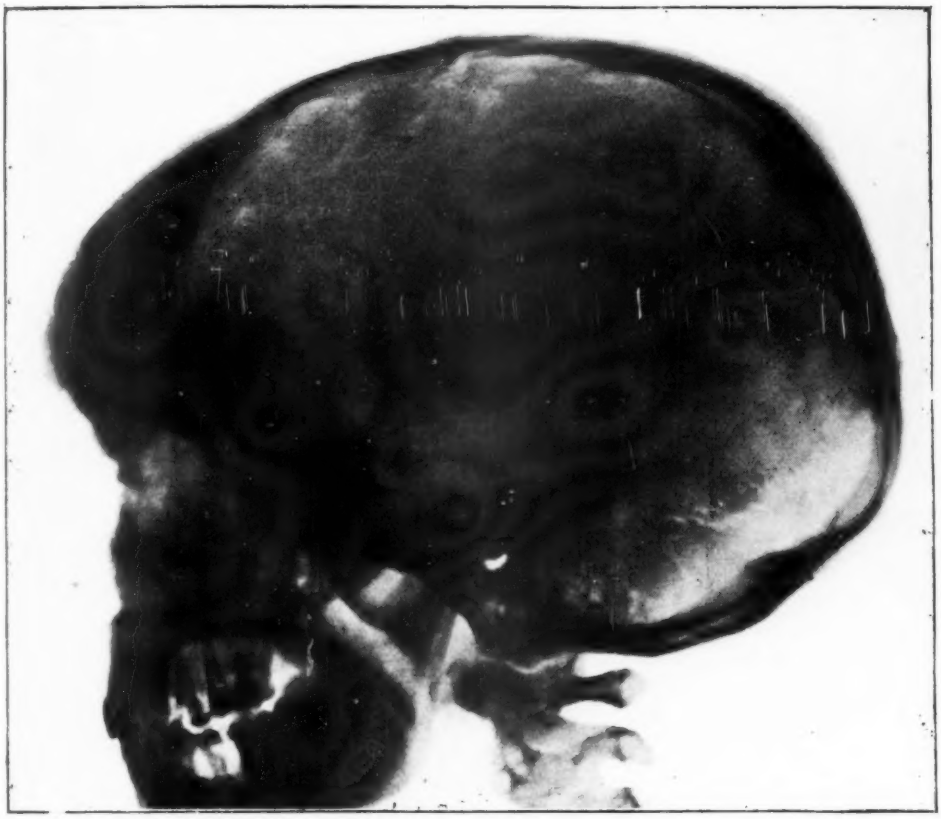

FIG. 5. SKULL: LEFT LATERAL VIEW.

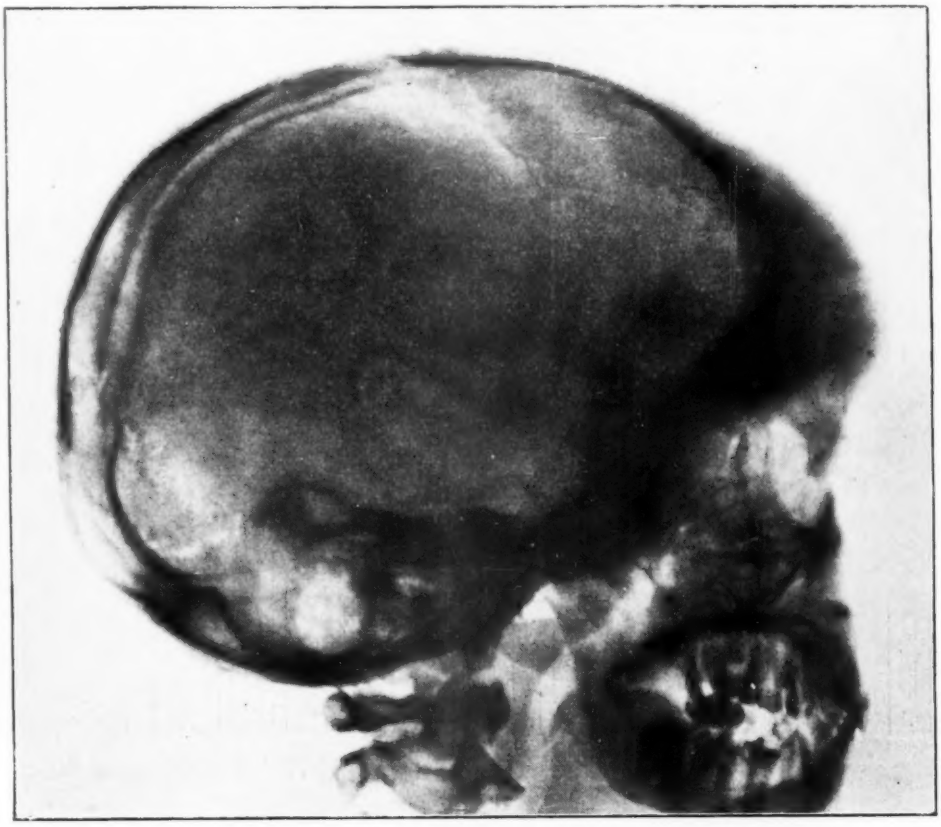

FIG. 6. SKULL: RIGHT LATERAL VIEW.

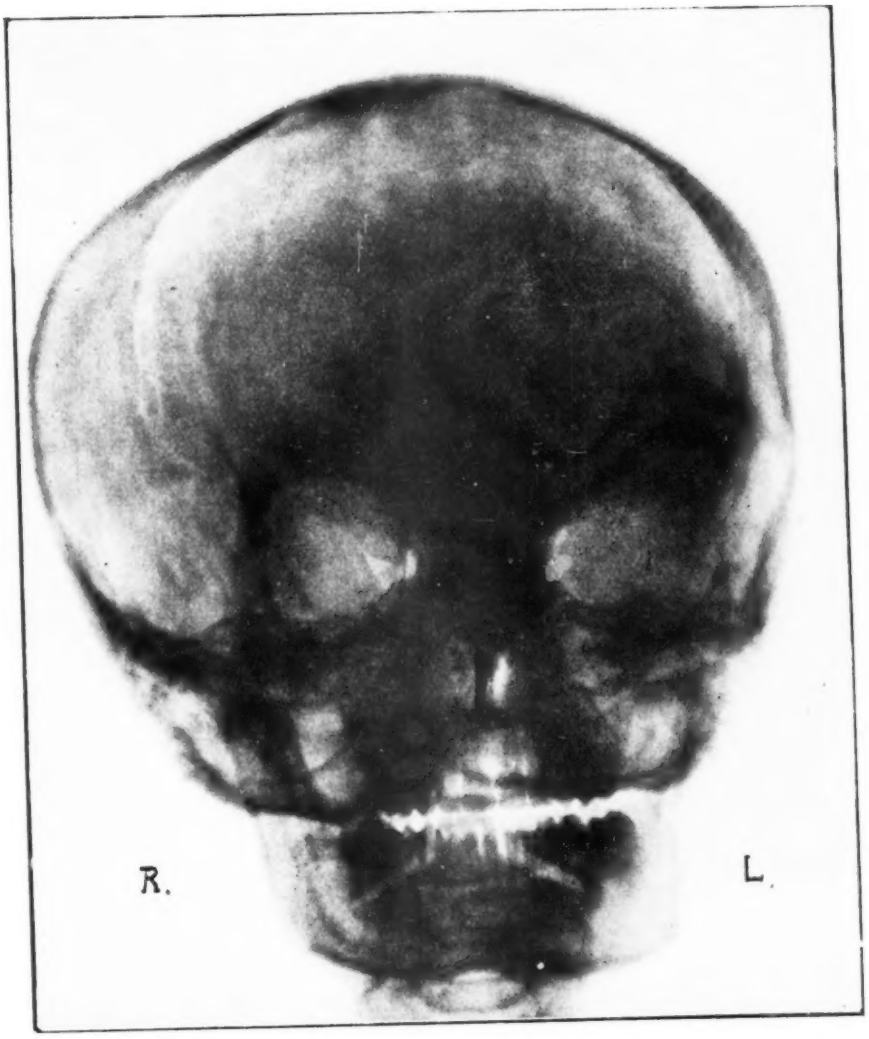

FIG. 7. SKULL: FACE DOWN

walls and floor. Whilst the ethmoidal cells are visible on the right side, no such cells can be seen on the left side.

The upper part of the left nasal cavity is occluded and the septum displaced to the right. From this it would appear that the ethmoid bone is also involved in the process of bony thickening. The sphenoidal fissure on the left side is on a higher plane than that of the right side.

C. Other bones. All other bones of the entire skeleton are radiographically normal.

2. *Report on Ears, Nose and Throat.* (*Dr. W. Sanderson.*)

The left middle turbinate bone is enlarged and cystic in appearance; and there is a small pharyngeal tonsil. Otherwise there is nothing abnormal in the nasal passages or nasopharynx. The tonsils are not septic. Both maxillary antra and both frontal sinuses are dull on transillumination. There is no indication of sepsis in the nasal accessory sinuses. The larynx and ears are normal. There is probably some defect in the sense of smell, but the results obtained (testing both nostrils at once, and also separately) have been too contradictory to be of value.

3. *Report on Eyes.* (*Mr. A. McK. Reid.*)

$$\text{Right Vision} = \frac{6}{12} \text{ with } +3{\cdot}0\text{D} = \frac{6}{6}$$

$$\text{Left Vision} = \frac{6}{12} \text{ with } \frac{+4{\cdot}0 \text{ D sph.}}{+0{\cdot}5 \text{ D cyl. axis. } 90^\circ} = \frac{6}{6}$$

The media are clear, and the fundi normal. There is no sign of increased intracranial pressure, nor of local pressure on the optic nerves.

The orbital margins are not irregular; and while the left eye is anterior to the right, this does not appear to be due to a localized thickening of the bone proptosing the eye, but suggests rather that the whole orbit has been pushed forwards *en masse*. For fields of vision see Fig. 8.

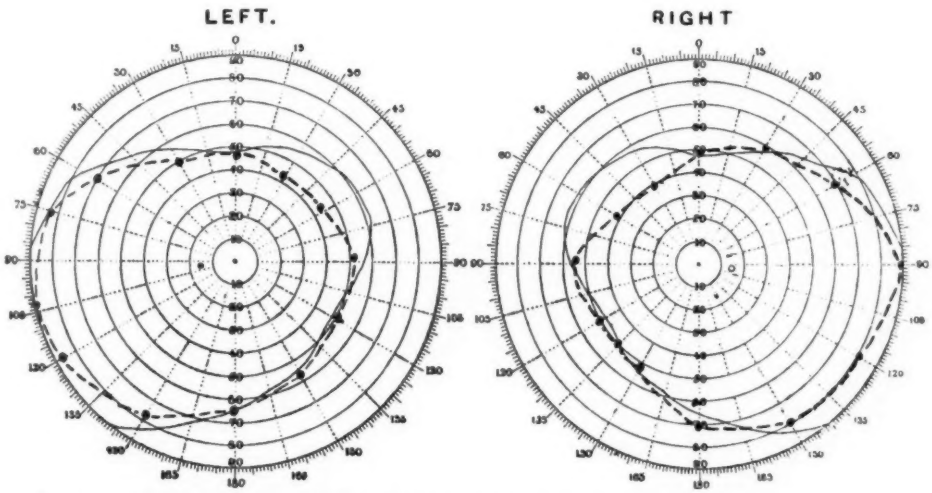

FIG. 8.—Outline of the patient's fields of vision for white shown thus: • – – – •

4. *Report on Teeth.* (*Mr. P. G. Capon.*)

The alveoli and teeth are well-formed and appear to be normal. The dental arches are satisfactory (Fig. 9.) Radiograms taken of all teeth do not show any special abnormality of tooth- or bone-structure.

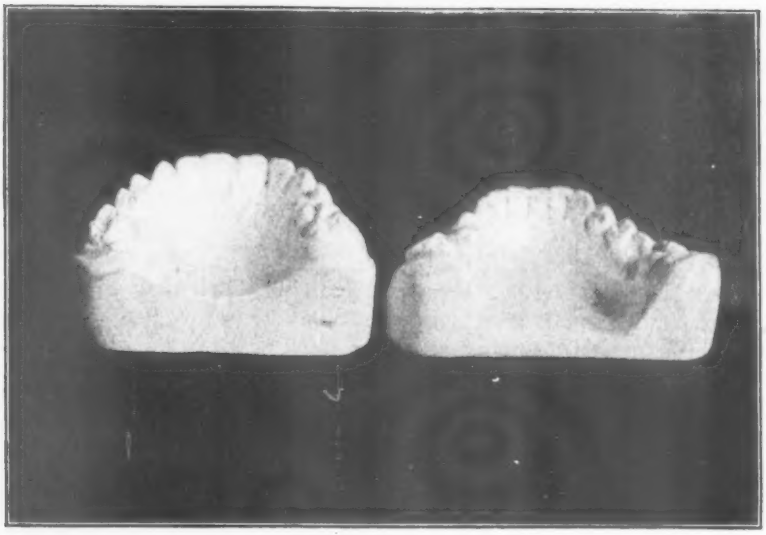

FIG. 9

5. *Biochemistry of Blood, Urine and Cerebro-spinal fluid.* (*Dr. R. Coope.*)

A. Blood. (*i*) *Calcium.* 11·1 mgrm. per 100 c.cm.

(*ii*) *Glucose Tolerance Test* (using 50 grm. of glucose).

	Blood.	*Urine.*
Before dose	66·6 mgrm. %	Absent.
½ hour after dose	80·0 „	„
1 „ „ „	111·0 „	„
1½ „ „ „	100·0 „	„
2 „ „ „	97·0 „	„

(*iii*) *Wassermann reaction :* negative.

B. Urine. Daily volume within normal limits. Reaction acid. Protein, a very slight trace at one examination only. Urobilin, very slight excess. Indoxyl normal. Acetone and sugar absent. Microscopically, nothing of special note.

C. Cerebro-spinal Fluid. Clear, watery fluid, discharged at a rate greater than normal. Protein normal. Sugar, 71 mgrm. per 100 c.cm. No gold curve obtained. Less than one cell per 1 c.mm. Culture sterile. Wassermann reaction negative in all dilutions.

6. *Examination of affected bone.*

Mr. J. T. Morrison reflected a small scalp-flap in the right parietal region and removed fragments of superficial bone, which was found to be surprisingly hard, and highly polished. A bone-fragment was incubated in culture-medium ; no growth of micro-organisms was obtained.

Histological examination showed that the spicules of bone consisted only of very dense compact osseous tissue. It is evident that the zone of active pathological change was not reached at operation.

DISCUSSION.

The name ' leontiasis ossea ' was chosen by Virchow[1,2] because the victims of cranial and facial hyperostosis bore some resemblance to patients suffering with fibroma molluscum (' leontiasis '). Obviously a definition of this kind allows too wide a latitude, and it is only natural that many different pathological conditions were regarded as cases of leontiasis ossea. Even Horsley's[4] classical paper, handicapped by the lack of radiographic examination, leaves the reader uncertain of the pathological nature of the cases so carefully described.

Before the papers of Lawford Knaggs [7] were published in 1923 the literature of the subject was most confusing; but the thesis of Ramijean[11] may be singled out as a careful study containing a very valuable bibliography.

Lawford Knaggs (*loc. cit.*) gave a full description of the disease; his papers have re-stimulated interest in its ætiology, pathology, and relationship to other chronic affections of bone, and especially to osteitis deformans (Paget's disease).

Most authors agree that in general terms the histological appearances of leontiasis ossea are those of osteitis fibrosa (osteodystrophia fibrosa); in brief, the normal bone disappears and is replaced by poorly calcified osteoid tissue, which undergoes fibrous transformation, with later ossification. (See Marx[9]; Lemaitre, Rouget et Ruppe [8]; Fettu[2]).

There is less unanimity regarding the relationship of leontiasis ossea to Paget's disease. Dawson and Struthers[1] in a very striking paper on generalized osteitis fibrosa hold that the changes seen in leontiasis ossea are consistent with those outlined as the late stages of osteitis deformans; Marx (*loc. cit.*) states that leontiasis ossea is like osteitis fibrosa, yet not identical with Paget's disease; Kanavel[5], writing in 1907, stated that the two conditions bore no relationship.

The clinical differences between leontiasis ossea and Paget's disease, such as age at onset, and distribution of bone-lesions, are generally well marked; but Hamburger and Nachlas[3] have reported a case which lends support to their view that at all events some examples of leontiasis ossea are the same as Paget's disease.

The ætiology of leontiasis ossea is still unknown.

In its clinical picture the signs and symptoms are largely a question of chance, and depend upon the site of the hyperostosis, and the structures which become compressed by the overgrowth of bone. Morelli[10] has recently reported two interesting examples showing ophthalmological signs.

In conclusion I wish to express my thanks to Dr. T. J. Coakley who referred the patient to me; to my colleagues, whose able reports are my justification for publishing this case; and to Mr. Lawford Knaggs, who has very kindly given me the help of his expert knowledge of this disease.

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POISONING BY " META FUEL " TABLETS (METACETALDEHYDE).

BY

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' Meta Fuel ' is now extensively used to replace methylated spirit for such purposes as are fulfilled by small spirit lamps and stoves. It acts as an efficient substitute in such circumstances, and has the advantage of being a solid substance, and thus easily portable and specially convenient. It is sold in small lamps and stoves, and refills are dispensed in the form of white tablets or cakes. Judging from my experience in connection with the first case detailed below, it appears that many who sell this material are ignorant of its composition and nature. Its poisonous properties on ingestion can hardly be too widely known.

The two cases reported in the present paper show that ' Meta Fuel,' when chewed up and swallowed, is slowly absorbed from the intestine. Circulating in the blood, it acts as a poison to the central nervous system producing drowsiness and convulsions, and the severity of these symptoms in the first case suggests that, with a sufficiently large dose in a young child, a fatal issue is by no means an impossibility. Excretion takes place through the kidneys and in the process irritation or inflammation of these organs can be set up, though the convulsions are independent of the condition of the kidneys.

' Meta Fuel ' agrees in its characteristics and reactions with metacetaldehyde, and it is remarkable that its activity should be so much greater than that of its isomer, paraldehyde.

Clinical Cases.

So far as I know the only case of poisoning by ' Meta Fuel ' already reported in the English literature is that recorded by W. H. Willcox and C. Ainsworth Mitchell in *The Analyst* (September, 1927). As I had the opportunity of seeing this case for Sir William Willcox during the acute convulsive stage, I reproduce here the published report of the case with the authors' kind permission. The second case described below was that of a young child who was admitted under my care at the Paddington Green Children's Hospital.

Case 1. Willcox and Mitchell[1] give the following account :—On June 8th, 1927, at 8 p.m., a boy of 16 swallowed, in mistake for a sweet, a portion (about 5 grm.) of a double tablet of the solidified fuel used as a substitute for methylated spirits.

No ill effects occurred till 3 a.m. on June 9th, when the patient became flushed, restless and delirious. The temperature rose to 100° F. at 6 a.m. Convulsions occurred on June 9th at 8 a.m., and five further attacks of convulsions occurred during the following 14 hours. The patient was semi-comatose during the intervals between the convulsions.

The urine had sp. gr. 1·014, was very acid, and contained a trace of albumin. There was marked tenderness of the calves of the legs during this period. The temperature remained between 100° and 101° F. for 36 hours and then fell to 99° F., where it remained for 24 hours, afterwards becoming normal.

The treatment consisted in large doses of alkalies* (in the form of sodium citrate, 60 gr.; sodium bicarbonate, 30 gr.; water to 1 oz.) given every four hours by the mouth; also normal saline containing 2 dr. of sodium bicarbonate to the pint was given rectally in amounts of 15 oz. every six hours.

Throughout the period during which the convulsions occurred chloral (10 gr.) and potassium bromide (30 gr.) were given every four hours. The urine remained very acid for three days, in spite of the large doses of alkali that were administered.

After the convulsions had ceased potassium bromide, in doses of 15 gr., was given three times a day for four days.

The patient made a good recovery, but the albuminuria persisted for four days. After recovery there was some loss of memory for several days.

November, 1928. The boy is said now to have recovered completely. The loss of memory was for a time very marked. His more recently acquired school work was forgotten, and even in September, 1927, his remembrance of the details of his August holiday was hazy. (R. M.)

Case 2. D. S., boy, aged 4 years, 11 months. At 1.30 p.m. on July 20th, 1928, he was given by another boy some 'Meta' bricks to play with. He ate one of these and soon after vomited. Vomiting was repeated at intervals, and at 6 p.m. he was seen by a doctor who sent him to hospital.

On admission to Paddington Green Children's Hospital he was found to be drowsy, and to show slight rigidity of the limbs. He answered questions with difficulty. Physical examination revealed nothing further. His stomach was immediately washed out, and clear, odourless, yellowish fluid was returned. During the night, July 20-21, the child retched frequently and vomited once.

At 6.15 a.m. on July 21st he had a slight fit, becoming stiff and cyanosed. His jaws were clenched. With this fit there was incontinence of urine. The fit passed off almost immediately, and at 11 a.m. he vomited again. He continued drowsy and it was noticed that while his left leg was rather rigid, the right foot was extended in the tetany position. He vomited twice more during the afternoon, and by the evening the drowsiness began to pass off. Some doses of bromide were given during the 21st. The urine contained no albumen.

By the 22nd the boy appeared well, and no further symptoms developing, he was discharged well on July 25th.

Chemical Considerations.

From the authoritative statements of Willcox and Mitchell which I here reproduce below, it appears that 'Meta Fuel' consists of metacetaldehyde. Presumably it is this substance which when ingested acts as the nerve poison, but what the authors say as to the possible influence of various impurities should be noted.

An examination of this Meta Fuel, which was confirmed by Dr. H. E. Cox, showed that it agreed in its characteristics and reactions with metacetaldehyde. It sublimed, without melting, at 112° C., forming feathery needle-shaped crystals, and, when heated, in a sealed tube at 120° C., yielded ordinary aldehyde. It was insoluble in water, but dissolved in chloroform and carbon tetrachloride. When heated with strong sodium hydroxide solution it was converted into the brownish so-called aldehyde resin.

The presence of paraformaldehyde had at first been suspected, but no indication of a pink coloration could be obtained by Schryver's test. The original substance, when boiled with water and filtered, yielded a solution which gave a faint yellow coloration with Nessler's reagent, whereas formaldehyde would have given a brown precipitate changing to grey.

In view of the fact that relatively large doses of paraldehyde can be taken, and that cases are on record of recovery after a dose of 1 oz. or more, it is remarkable that metacetaldehyde

*These doses of alkali were prescribed by the present author under the mistaken impression that 'Meta Fuel' consisted of hexamine.

should be so much more active than its isomer. It is possible, however, that traces of the condensing agents used in the preparation of metacetaldehyde may be left in the final product and have some influence on its physiological action, since no particular care would be taken to make an absolutely pure product. The list of substances claimed in the patents for the preparation of metaldehyde fuel is a very long one, and includes such substances as sulphuric acid, hydrochloric acid, zinc chloride, phosgene, etc., so that the range of possible impurities is very wide.

Cases Previously Reported.

From an examination of the *Index Medicus* I have under the heading "Metaldehyde" been able to trace reports of four cases occurring on the Continent.

The first case ever recorded is that of P. Gautier and R. Colomb[2] who reported an instance of poisoning from swallowing one 'Meta' tablet in a child of two and a half years. He complained of pain in the stomach one and a half hours later, and vomited. When first seen three hours after the dose, he was semi-comatose, and later was convulsed.

In 1927 two cases were reported. One by H. Belfrage[3] in a child of three years, and another by P. Wolfer[4] in a boy of four years old. In both cases nervous symptoms similar to those already detailed were observed. A fourth case is also mentioned as published in the *Neue Zurcher Zeitung* in June, 1927, but I have not been able to consult this communication, nor have I been able to trace the name of its author.

Discussion.

'Meta Fuel' is sold in white tablets or blocks, and is by no means unattractive in appearance. Left within reach of small children it is, one would think, not unlikely to be tasted or eaten. Its taste is apparently uninteresting but not prohibitive. In the case of the boy of 16 (Case 1) who ate such a comparatively large amount of it, he said at the time that 'he did not think much of it.' In this instance the boy ate the 'Meta Fuel' thinking that it was a special sweetmeat brought from abroad for him, and would certainly not have taken it except for this particular misapprehension. In the case of the younger child, he was playing at bricks with it, and it would seem that for children of about five years old, the 'Meta Fuel' might have a dangerous fascination.

When swallowed, the 'Meta Fuel' is absorbed slowly, a point of importance in relation to treatment. In the boy of 16 no symptoms appeared for seven hours, and it was twelve hours before the first convulsion. Bouts of convulsions continued during the ensuing fourteen hours. In the little boy of 5, who had probably vomited some of the dose taken, drowsiness appeared in $4\frac{1}{2}$ hours, and his one convulsion after $16\frac{3}{4}$ hours.

Most of the younger children in the cases quoted suffered from vomiting and abdominal pain after swallowing the 'Meta Fuel.' We may conclude that it acts as a gastric irritant. One case showed albuminuria lasting for several days, and as the metacetaldehyde is excreted *via* the kidneys and can be recognized in the urine, it is probable that it acts as a renal irritant.

With regard to treatment, gastric lavage is obviously indicated, and the slow rate of absorption from the intestine suggests the advisability of administering an immediate purge. There seems to be no direct antidote to the poison known. The administration of alkalies probably prevents the formation of acetic acid in the alimentary tract. The convulsions are amenable to the ordinary symptomatic treatment.

Conclusions.

1. 'Meta Fuel' tablets when swallowed are slowly absorbed. They consist of metacetaldehyde which acts as a nerve poison, producing coma and convulsions.

2. As 'Meta' tablets are rather attractive in appearance and may easily be left within the reach of small children, the public should be made aware of their poisonous properties.

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EXTREME HYPERSENSITIVENESS TO COW'S MILK PROTEIN IN AN INFANT.

BY

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Hypersensitiveness to cow's milk is a not uncommon cause of asthma, eczema and allied anaphylactic phenomena in adults, but very few cases of its occurrence in infants appear to have been described.

Park[1] reports the case of a breast-fed infant which, at the age of six weeks was given a little cow's milk and which, after three or four hours, vomited, became collapsed, and later had diarrhœa. The child was desensitized by the mouth with gradually increasing doses beginning with 0.0001 c.cm. until large quantities of milk could be tolerated. Weill[2] had a similar case which was cured by subcutaneous injection of doses of from 5 to 10 c.cm. of autoclaved cow's milk; as Coke[3] points out, the autoclaving of the milk would appear to place the treatment in the category of non-specific protein therapy. Coke[4] describes a case in a breast-fed infant, which was, during a short illness of the mother, fed on cow's milk (which was well borne) for 48 hours. On weaning, it was found that the child could not take cow's milk, having been sensitized by the previous isolated 'doses.'

Author's Case.

The case to be described occurred in a breast-fed female child, aged eight months.

Family History. Neither of the parents shows any sign of, or is aware of, any protein sensitiveness in themselves. The paternal grandfather has eczema and asthma (probably due to a sensitiveness to his own respiratory tract infectors) of over twenty years standing, and now complicated by bronchitis and emphysema. The maternal grandmother has asthma (? cardiac). A maternal uncle has asthma which was improved by the removal of horsehair-stuffed furniture from his bed room. No further relevant history can be elicited.

Clinical Picture. The patient, female, aged 8 months, was a first child, exceedingly healthy, and above average weight.* She was fed on the breast exclusively until the age of eight months, when, as the mother was found again to be pregnant, it was decided to commence weaning. The first meal, other than from the breast, consisted of cow's milk suitably diluted with lime water and with sugar added. This meal caused, almost immediately, acute illness. The infant developed extreme pallor, with a marked local reaction as shown by redness and œdema of the lips, circumoral skin and buccal mucous membrane. With this there were very severe and typical asthma, and repeated violent vomiting. The vomit consisted at first of the ingested food, and later of thin, clear, slightly frothy mucoid fluid. Chemosis appeared later, but this was probably to be interpreted as another local reaction due to the child's rubbing her eyes with vomit-contaminated fingers: severe chemosis was noted in relatively mild attacks later, when the child had been sick in bed and so contaminated her pillow, while not under direct observation. The original attack, which lasted about an hour and a half and left the child prostrated, could not be mistaken for anything other than an anaphylactic phenomenon. Breast-fed for the remainder of the day, the child appeared normal next morning.

* The case did not occur in Sanatorium practice; there was no suggestion of a tubercular element in the condition.

Course and Treatment. The child gave a marked positive skin reaction to cow's milk and a slight positive reaction to egg albumen. No other positive reaction was obtained.

Since so many common articles of diet contain more or less cow's milk, it seemed that this sensitiveness was likely to prove a greater handicap than most in after life, and it was therefore determined to attempt desensitization by the mouth, keeping the child meanwhile on the breast. An attempt was made at the same time to obtain a goat as a supply of milk, but very few goats are in milk at the time of year in question (winter, 1927-8), and further, on account of the then prevalence of foot-and-mouth disease, great difficulty was experienced in obtaining permission to move stock. It was not until three months later that a goat was obtained. Several proprietary foods, dried and otherwise, which have cow's milk as their basis, were tried but, as was to be expected, held no advantage over fresh cow's milk. All the likely firms were written to, but none were able to supply goat's milk in the dried form.

By experiment it was found that four drops of cow's milk diluted in two tablespoonsful of water caused only a slight local reaction and no demonstrable general reaction. This dose was given every second day and was gradually increased until, when the mother's milk began to fail, about a month later, the child was able to take a teaspoonful of milk in a day without undue reaction except for occasional sickness or slight croupy respiratory embarrassment. During this period, the child's weight remained stationary, and, while not exhibiting the sparkling health that had previously been hers, her general condition was good. In weaning, great difficulty was experienced; the main diet had to be extracts of meat, soups, etc., and, although there was no evidence of further idiosyncracies, sickness was very troublesome and the child lost 5 lb. during the ensuing two months. Rightly or wrongly, the process of desensitization was persisted in during this period, and by the end of it the child showed no marked reaction after having one ounce of milk during the day.

At about this time the child was seen by Prof. C. W. Vining, of Leeds, who kindly drew up a dietary excluding cow's milk. At about the same time a goat in milk was procured. Fed on the basis of Prof. Vining's dietary and with goat's milk as the staple food, the child's condition immediately showed improvement.

Once the child's nutrition was assured, it was felt that wider experimentation in the matter of dosage of cow's milk was permissible, and during the next two months it was found that the best results were obtained by giving at intervals of three or four days, just that dose which failed to cause a local reaction. At first the child was able to discriminate between the two milks, apparently by smell, certainly without tasting. She enjoyed the goat's milk, but the cow's milk had to be given as a medicine. Gradually this power of discrimination and the dislike for cow's milk appeared to be lost, although a dose of cow's milk rather too much in excess of the previous one would still cause a greater or less degree of reaction.

By the time the child was sixteen months old, her weight was again normal, her dentition, walking and talking had progressed to the extent that one would expect for her age, and, in short, except for the difficulty with cow's milk, she appeared a normal healthy child. She was at this time having 4 ounces of cow's milk during the day, every fourth day. At this stage or earlier, cream (really thick 'separated' cream) was found to be a valuable food, and was given without stint on the days on which she was not receiving cow's milk, the amount of protein in the cream being far short of the dose to cause reaction. Reactions, which were now rare, slight and generally delayed 6 to 18 hours, usually took the form of croupiness and hoarseness.

Progress thereafter was rapid and uninterrupted. At four-day intervals the dose was increased by half an ounce at a time, until the child was having 8 ounces in the day, every fourth day. Then this dose was given every day for a few days. Thereafter the dose was further increased until now, 12 months after the start of the trouble, the child is able to take as much cow's milk as she desires with no after effect.

The slight sensitiveness to egg has of late been treated, with scarcely any difficulty, on similar but less exact lines.

Discussion.

The questions of how and when the child became sensitized are difficult. The mother states that when the child was about six months old, she gave her a sip of cream (not milk) and the juice of stewed rhubarb from her own plate. The rhubarb was blamed for the subsequent violent sickness, but from the mother's description of the condition, the writer is inclined to think that the child even at that time was sensitive. The mother is positive that with this exception she gave the child no food other than her own milk, until she was eight months old. It is possible that an officious domestic may have at some time, perhaps when the infant was crying, given her a few sips of cow's milk. The corollary suggests itself that, as a prophylactic measure, in the case at least of infants in whose family there is an 'asthmatic' strain, and whose mothers appear to have an ample supply of milk, care should be taken that prior to weaning, the child should not be allowed to have isolated mouthfuls of foreign protein-containing foods: further, that each new protein, as it is introduced into the child's dietary, should be given at intervals of, say, not longer than a week in in order to prevent sensitization.

The account of this case is communicated in some detail, not so much on account of the rarity of the condition, as because it seems possible to the writer that lesser degrees of the same condition may be commoner than is supposed. Is it not possible that many of the cases in which there is difficulty in weaning on to cow's milk may be due to a sensitiveness of a much less degree, in which the anaphylactic signs are much less typical than in the case described? If so, it seems reasonable to suppose that they would yield to desensitization along the lines described above, but probably much less stringently carried out.

Conclusions.

From the experience gained in the conduct of this case, one would suggest that the following are important factors in successful treatment.

1. The diet must be adequate and of such a constitution as is easily dealt with by the infant's digestion. In this case, goat's milk was the staple food which was best borne. Further, once the desensitization is well under way, good cow's milk cream (*i.e.*, the more nearly pure milk fat the better) is a safe and valuable food.

2. The optimum dose of cow's milk for desensitizing is that which just fails to produce a reaction which is perceptible clinically.

3. In the early stages at least, desensitizing doses should not be given too frequently, probably not more often than twice weekly. The writer feels certain that had he been able to observe the above indications from the start, desensitization could have been carried out with little or no upset of the child's health and progress; the time required for successful treatment would probably not, however, have been appreciably shorter.

4. In private practice it would be extremely difficult to carry out the method of desensitization outlined without the co-operation of intelligent parents or a nurse.

The writer is indebted to Dr. F. Coke for supplying him with the reference to Weill's work.

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HÉMI-HYPERTROPHIE ALTERNE.

BY

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It is not uncommon to meet from time to time with cases exhibiting hypertrophy or giantism of some part of the body, of greater or less extent. It may be a part or the whole of a limb, one side of the body, or one half of the face.

The following case is an example of such partial macrosomia.

M. I., female, aged 13 years (Dr. Hartley Martin). Reported "healthy child, but gets fluid in left knee about once a year." When aged 5 years she fell at school and injured her left leg. It was noticed first at this time that the left leg was longer than the right. Since this fall she has had occasionally fluid in left knee.

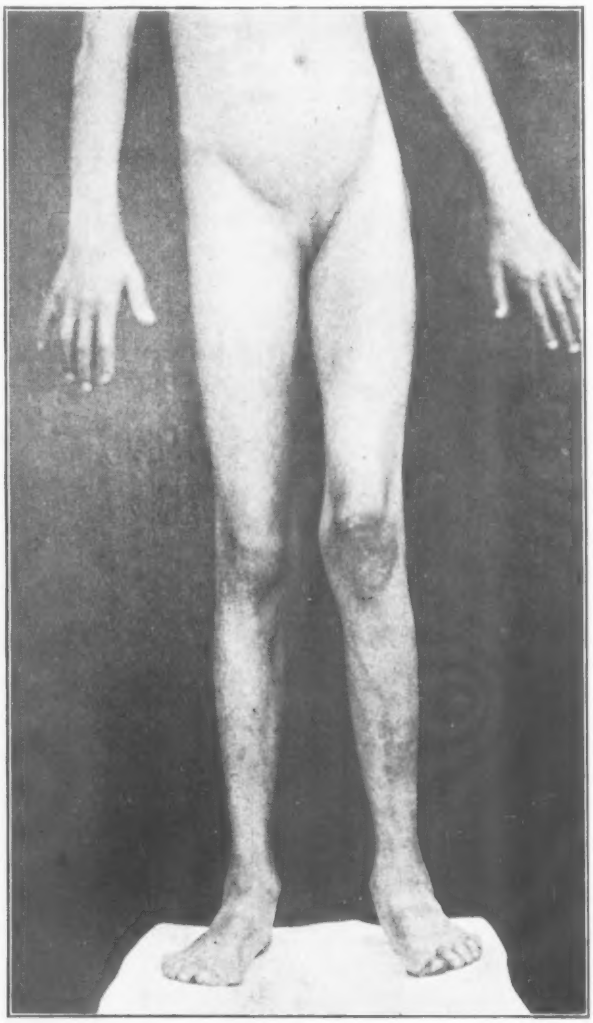

Fig. 1.—Case of Partial Macrosomia, aged 13 years.

The left leg is obviously bigger and longer than the right (Fig. 1):—

Length of leg: left, 84 cm., right, 80 cm.

Girth of thigh: left, 33·5 cm., right, 31·7 cm.

The reflexes on the two sides are equal.

The synovial membrane of the left knee is greatly thickened. The whole of the left leg shows many superficial dilated vessels, and the soft tissues appear varicose and unhealthy.

X-ray examination proves the existence of true hypertrophy of the left lower limb and healthy bones. Although no abnormality was noted until the age of 5 years, and the condition may consequently be of post-natal origin, it seems more probable that it is congenital, with superadded trauma to the knee arising from instability due to asymmetry.

The above is a case of asymmetry due to true macrosomia, but somewhat similar effects may be produced as a result of atrophy or true microsomia :—

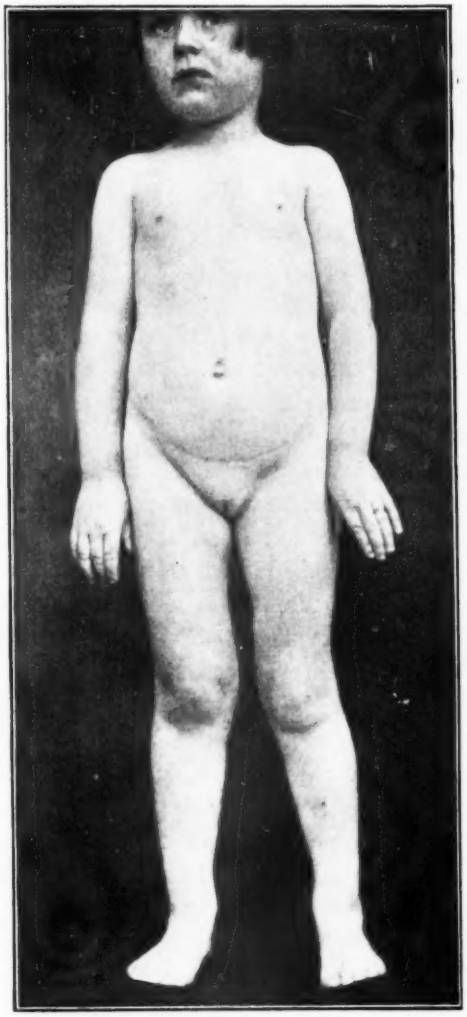

Fig. 2.—Case of True Microsomia, aged 5 years.

J. D., female, aged 5 years (Dr. McFarland). Healthy child. Mother reports that at time of birth it was noticed that the child's left arm and left leg were limp, so much so that the doctor feared they were injured; and that she has always been smaller on the left side than the right. She began to walk and talk at about the age of 15 months, and is apparently mentally normal.

On examination the whole of the left side is at once seen to be smaller than the right (Fig. 2), and X-ray examination proves that this difference affects also the bones. Ossification is equally advanced on the two sides.

The reflexes are normal and appear to be equal on the two sides. The superficial tissues of both sides are healthy, but the mother states that the left leg is often colder than the right.

The measurements of this child are given in Table 1.

TABLE 1.
MEASUREMENTS IN CASE OF MICROSOMIA.

Measurements.	Right.	Left.
Ears: greatest breadth	6·2 cm.	5·2 cm.
Arms: length	46 „	43 „
girth of forearm	15·5 „	14·8 „
Legs: length	56·5 „	54·5 „
girth of thigh	31·8 „	27·4 „
girth of calf	24·4 „	22·2 „
Thorax: hemi-circumferences	28·5 „	27·5 „
Abdomen: hemi-circumferences	28·8 „	26·2 „

It is uncommon to meet with a case of complete unilateral hypertrophy, and a case of *hémi-hypertrophie alterne* or giantism of one half of the trunk and corresponding limbs, with hypertrophy of the face on the opposite side, is very rare.

As the result of exhaustive search into the literature Gesell[1] found that up till April, 1927, 53 cases in all of true unilateral hemi-hypertrophy had been reported. (Of cases recorded since that date may be noted those by McFarland[2] and Ougrelidze[3]).

In a previous communication Gesell[4] gives a table " of thirty cases of partial and crossed hypertrophies " and states in allusion to it " Table 4 is by no means complete, for such partial or restricted hypertrophies are much more common than true total hemi-hypertrophy."

The table includes three cases which would appear to come under the designation crossed hemi-hypertrophy (the cases of Bankhart, Jacobson and Lewen), but in none was the condition that described by André Thomas[5] as "hémi-hypertrophie alterne." Thomas wrote: " L'hypertrophie faciale peut exister seule, ou bien les membres du même côté sont également hypertrophiés ; dans d'autres observations plus rares (Lewen) l'hémi-hypertrophie est croisée. La face et membre supérieur sont hypertrophiés d'un côté, le membre inférieur du côté opposé, il est sans doute exceptionnel que la face soit prise d'un côté, les membres et le tissu du côté opposé ; dans leur travail, Sabrazés et Cabannes n'en rapportent aucun cas démonstratif ; il s'agit alors en quelque sorte d'une hémi-hypertrophie alterne." In the case described by him there was hypertrophy of the face and tongue on the right side and of the limbs and trunk on the left side.

A case which is difficult to place, and was not quoted by Gesell, was published by Chodak Gregory[6]. In this case, a female aged 2½ years, showed hypertrophy of the left leg, abdomen, thorax, arm and face, with greater semi-circumference of the skull on the right side.

Noronha[7] described the case of a male Mahomedan, aged about 18, whose face was bigger on the right side, and the trunk and limbs larger on the left, and Slaughter and Eberhardt[8] reported the case of an American seaman aged 21, who exhibited "an asymmetrical hemi-hypertrophy involving the right side of the face, the right upper extremity and the left lower extremity."

Of these cases, only that of Noronha is similar to the condition coming under the designation " *hémi-hypertrophie alterne* " as described by Thomas and quoted by Ballantyne.[9]

The term hypertrophy is here used in the sense of a true macrosomia—an abnormal largeness of all the tissues ot the part involved. There is thus excluded all forms of false hypertrophy, *i.e.*, hypertrophy affecting the soft tissues but not the bones, such as Milroy's disease (congenital or hereditary œdema) and elephantiasis.[10]

Ballantyne[9] defines macrosomia as a monstrous largeness of all the parts of the individual which may have its origin before or after birth, and he prefers the terms 'unilateral macrosomia' to that of 'hemi-hypertrophy.' Acquired hypertrophy, hypertrophy of post-natal origin, is not uncommon of the false type, *i.e.*, where the bone is not affected. It is rarely, even when localized to a comparatively small area, of the true type. (The case described by Simpson[11] was that of a true hypertrophy, and may have been post-natal in origin.) The ætiology of true congenital macrosomia is still obscure. Ballantyne stated :

"We may frankly admit that we do not know the causes of unilateral macrosomia or their mode of action ; indeed, we do not know those of general macrosomia, and we can hardly, therefore, expect to be more successful in our attempts to arrive at these of the partial variety of giant growth. . . . From the standpoint of ante-natal pathology we have only to do with the congenital cases ; and among them there are some which may be truly embryonic in origin while others are apparently fœtal. It is often exceedingly difficult to separate the giant growths which are really due to an original anomaly of growth from those which arise in the fœtal period of ante-natal life and are caused by such diseases as congenital elephantiasis and angiomata. . The causes which are usually alleged in connection with all teratological cases are also advanced to explain unilateral macrosomia of the head and face ; and the theory that in some way the overgrowth is due to perverted action of the nervous system (fœtal meningitis) would appear to be the most probable. On the other hand, there is much to suggest that the macrosomia originates before the fœtal period of life, and therefore before fœtal diseases can be invoked as causative agencies. Our knowledge of the teratogenesis of this, as of all forms of macrosomia and microsomia, is, after all, close neighbour to nothing."

It has been noted by several observers, among them Lockhart Mummery,[12] that true congenital hypertrophy of one half of the body and face has been associated with a greater size of the cranium on the opposite side. A photograph of Mummery's patient appears in Purves Stewart's book on the Diagnosis of Nervous Diseases, and in allusion to it the author states that the condition was "probably of cerebral origin . . . the right side of the cranium and presumably also the right side of the brain were larger than the left," while the hypertrophy of body and face was on the left side. It is obvious that such a suggestion is by no means an exposition of the fundamental ætiology, and in recent years the most interesting and intriguing opinion is that of Gesell (*loc. cit.*). He considers that hemi-hypertrophy, while being a "morphogenetic anomaly dating back to an early embryonic stage," is to be regarded as a "minimal form of twinning." "It is a unilateral enlargement of one-half of the soma, a hemi-macrosomia. As such we may interpret the condition to be an atypical or a paradoxical form of twinning, a hybrid variant of the same process which may produce a double monster or a completely symmetrical individual. The biologic paradox consists in this, that the hemi-hypertrophy is neither double monstrosity nor bilateral duplicity ; it is half of each, as though the individual remained two conjoined hemi-creatures, each with a discrete though half realized genetic destiny."

As Ballantyne says, " In all speculations about the ætiology of anomalies of growth, it has constantly to be borne in mind that a theory to be satisfactory must account for the facts, and for all the facts." Cases of *hémi-hypertrophie atterne* do not render theorizing any simpler.

Before reporting the following case which appears to be one of this type of macrosomia, two recent publications may be alluded to.

Ilse Graetz[13] describes a case from the Children's Clinic of the University of Kiel of " sogennanter ' totaler halbseitiger Körperhypertrophie.' " In this case (a girl of 1½ years) the whole of the left side was more developed than the right, but whereas the hypertrophy of the leg was a true hypertrophy, that of the arm with the exception of two fingers was proved by X-ray examination to be a hypertrophy solely of the soft tissues.

In discussing the case he writes : " Es handelt sich bei der sog. Halbseitigen Hypertrophie gar nicht um eine " einfache Hypertrophie " der einen Körperhälfte, gleich als ob das Individuum aus zwei zwar zueinander nicht passenden, aber in sich ' normalen ' Hälften bestände, von denen es fraglich sein könnte, welche von beiden Hälften die (für das betreffende Individuum) ' normale,' welche die ' pathologische ' sei, sondern die sog. halbseitige Hypertrophie trägt in allen genau untersuchten Fällen stets den *Charakter einer Missbildung.*" Later he states : " In allen genau untersuchten Fällen zeigten die hypertrophierten Organe einen—mehr oder minder—pathologischen Befund," and the last words in his concluding summary are " Bei allen genau durchuntersuchten Fällen von partiellesm wie halbseitigem Riesenwuchs handelt es sich nie um eine ' reine Hypertrophie,' sondern stets um dystrophische Verânderungen der hypertrophierten Organe."

This case of Graetz is interesting in its apparent mixture of true and false hypertrophies, but its study seems to have carried the author off his feet and into the use of those dangerous words " always " and " never." Further, he appears to consider that no English case has been " genau durchuntersucht," as no English author is quoted in his extensive bibliography. This seems a pity, as an evening with Ballantyne may be both illuminating and chastening.

The other report is that by Wakefield[14]. He reports a case of congenital false hemi-hypertrophy of the right side in a girl of 6 years. When discussing ætiology he remarks : " Practically all the exponents of the many theories on this anomaly, except one (Gesell) have been content to advance their theory and then silently repent. In the future when fashionable medical thought turns to something more obscure than embryology we are sure to have more interesting theories on this anomaly."

Hémi-hypertrophie Alterne.

Case Report :

J. F., female, born February, 1924 ; examined 16th August, 1928. Height, 95 cm., weight 36½ lb. (Dr. Foster, Birkenhead). Son of maternal aunt has syndactyly. No history of twins in any part of the family.

Parents healthy. Mother reports fall at fifth month of pregnancy. Two other children, both girls, aged respectively 8 years and 2½ years: both well formed and healthy. No miscarriages.

Noticed at birth there was 'a water bladder like a balloon on the navel.' The baby appeared quite healthy, but it was evident at birth that the right side of the body and the right arm and leg were bigger than the left; while the left side of the face and left side of the tongue were

Fig. 3.—Case of *Hémi-hypertrophie alterne*, aged 4 years.

bigger than the right. The differences were as marked at birth as at 4 years old. She has been a fairly healthy child and had no serious illness. She did not walk till she was 3 years old and talks very little even now. There is an indefinite history of fits in babyhood, but delay in walking and talking is largely explicable by disparity in size of legs and of two sides of tongue. She is, however, definitely mentally retarded, although her mother considers her quite sensible.

No vascular or trophic changes are detectable; temperature, sensibility and perspiration are similar on the two sides. The reflexes are equal on the two sides.

Measurements.

Head circumference, 46 cm., right half, 23 cm., left half, 23 cm.
Vault of skull to posterior angle of jaw: left, 17 cm., right 15 cm.
Ear to mid-line of lip: left, 11 cm., right, 10·5 cm.
Teeth: 5 above and below on either side.
Left half of tongue much larger than right, and left cheek, ear and face generally noticeably larger than right.
Arm: total length (acromion to tip of mid-finger), right, 47 cm., left 42 cm.
Upper arm: length, right, 24 cm., left, 20 cm.
girth, right, 17 cm., left, 16 cm.
Lower arm: length, right, 16 cm., left, 14 cm.
Chest: hemi-circumference, right, 32 cm., left, 29 cm.
Abdomen: hemi-circumference, right, 32 cm., left, 27 cm.
Leg: total length, right, 51 cm., left, 45 cm.
Thigh: length, right, 27 cm., left, 24 cm.
girth, right, 31 cm., left, 21 cm.
Lower leg: length, right, 24 cm., left, 21 cm.
Foot: length, right, 17 cm., left, 15 cm.
Right labium markedly larger than left.
No abnormality or peculiarity distinguishable as regards internal organs.
X-ray examination shows increased size of the bones of the right side with advance in ossification (see Fig. 4 and 5).

Discussion.

In many of the reported cases of macrosomia and hemi-hypertrophy, nævi, cutaneous congestion, or other superficial deviations from the normal have been noted. These are frequently on the hypertrophied side of the body or on both sides, but a particularly interesting case with reverse localization is reported by Babonneix.[18]

In some cases dentition is noted as being more advanced on the hyper trophied side ; and the same is sometimes true of ossification.

While the general health is usually good, many of the cases are reported as being feeble-minded. In the case reported by Thomas, however, first seen when aged 4 months and later when 27 months, it is noted that the mentality was normal and the physical differences had, during the interval between observations, become rather less.

What does the future hold in store for J. F., and on what lines should she be treated ?

She has been under observation nearly 12 months, and although during this period her physical disproportion has not increased, it has not to any appreciable extent diminished.

We know that in some cases of this kind, with the passage of time, an approach towards normal symmetry occurs, and from the physical aspect there is consequently no call for pessimism. With the assistance of the orthopædist she should grow up if physically incommoded, yet not seriously either incommoded or disfigured. The seat of gravity in prognosis lies deeper. She is feeble minded, and she will certainly " be permanently incapable by reason of such defectiveness of receiving proper benefit from the instruction in ordinary schools " (Mental Deficiency Act, 1927).

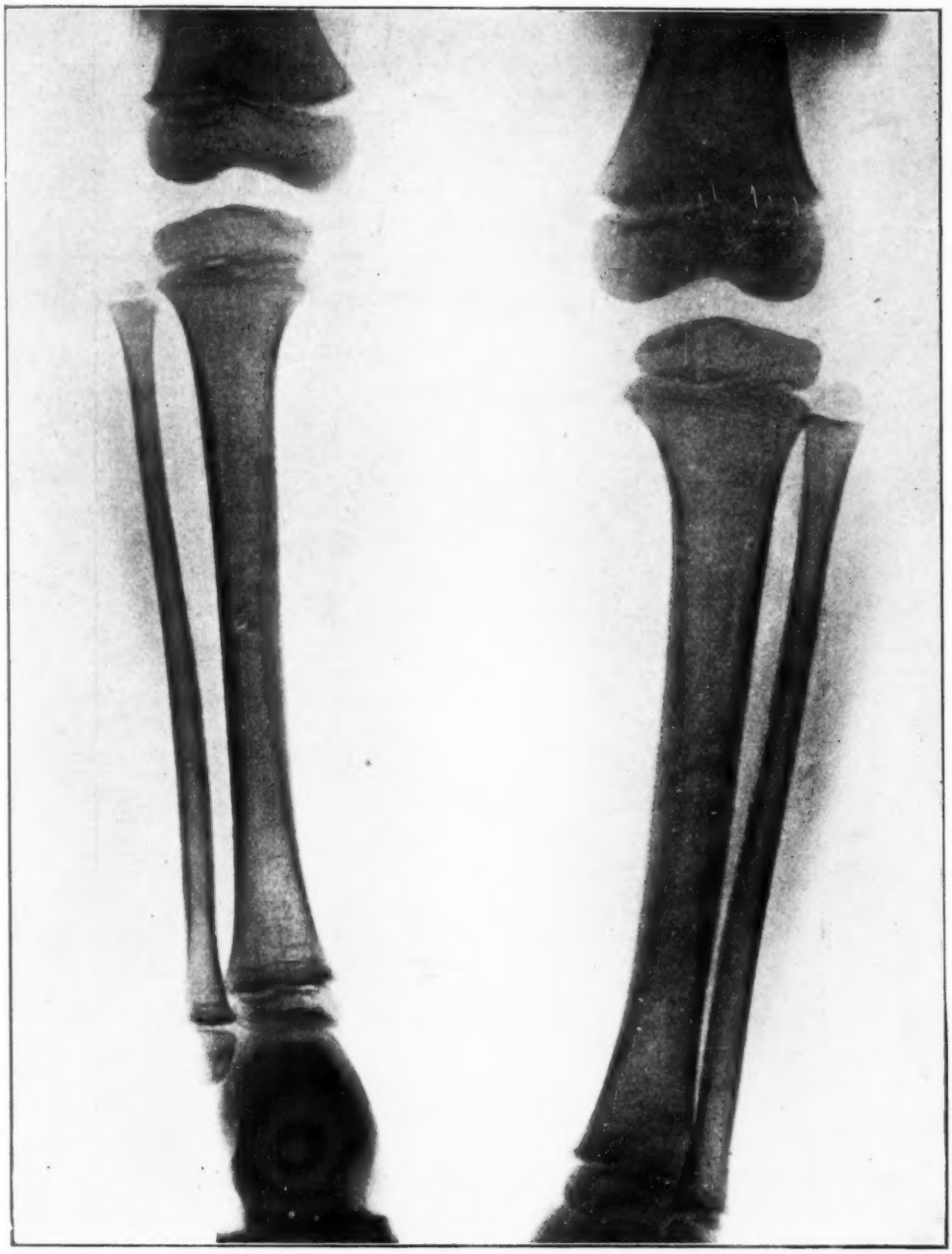

Fig. 4.—*Hémi-hypertrophie alterne*: skiagram showing increased size of bones and advanced ossification on right side.

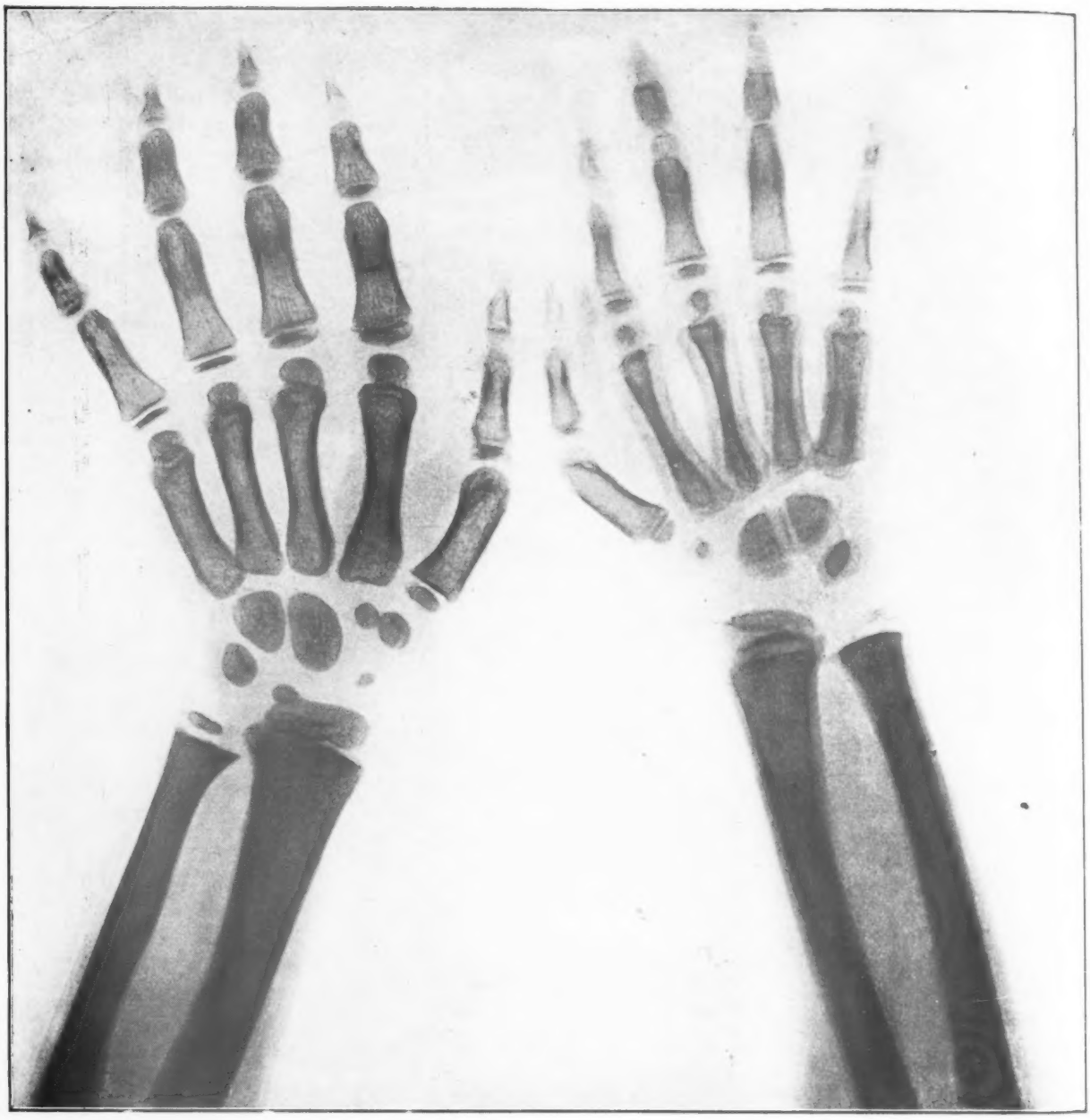

Fig. 5.—*Hémi-hypertrophie alterne*: skiagram showing increased size of bones and advanced ossification on right side.

Suitable education and training is here a matter of medical direction, and such direction must be away from the Ordinary Elementary School and the Special School for Physically Defective Children, and towards the Special School for Mentally Defective Children. Orthopædic ailments or defects not infrequently are so obtrusive from the purely orthopædic aspect, that the basal lesion or its non-orthopædic results or concomitants pale in comparison.

It is but a step from an orthopædic clinic to a P. D. School. But orthopædic conditions resulting from intracranial trouble, be it congenital or post-natal, developmental or acquired, in most instances are but one form of expression of a double defect, and the obvious orthopædic defect is of comparatively minor importance. The other form is feeble-mindedness, and the clamant call is for appropriate education.

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DEFECTIVE CHILDREN AND SPECIAL DAY SCHOOLS.

BY

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Mens sana in corpore sano—such is the proof of complete success in medicine; the two elements of normal life are inseparable, and in childhood determine the reciprocal and vital importance to each other of Education and Pædiatrics.

History of Legislative Measures.

In this country compulsory education was instituted by the passing of the Elementary Education Act in the year 1870.

As a result of experience gained in the working of this Act a Royal Commission was appointed in 1885 to deal with blind, deaf and dumb children, and such other cases as from special circumstances would seem to require exceptional methods of education. The Commissioners reported in 1889, and in Part 3 of their Report, stated that there was no clear line separating idiots and imbeciles: the difference was one of degree and not of kind. They came to the conclusion that there was a class of children of weak mind from birth or an early age, of whom a certain number required special educational arrangements to develop such faculties as they possessed, and they emphasized the importance of manual and industrial training for such children. The Committee set out a scheme of education, the main credit for which was due to Dr. Shuttleworth, and this scheme practically holds the field to-day.

The Commissioners stated that the means requisite for improvement were:

(*a*) *Physical.* Good food, healthy surroundings, judicious medical and nursing care, and specially adapted physical exercises. Faulty personal habits have to be corrected.

(*b*) *Moral.* Kindness and firmness are essential to gain the confidence and obtain due control of the pupil. Religious feelings must be awakened and informed.

(*c*) *Education.*(1) School exercises based upon the axiom of Seguin that the 'education of the senses must precede the education of the mind.' (2) Industrial training: (*a*) Simple housework; (*b*) Simple out-door work and garden and farm work; (*c*) Sewing and certain handicrafts.

After making various suggestions with regard to the care and education of imbeciles, the Committee recommended that feeble-minded children should be separated from ordinary scholars in public elementary schools in order that they might receive special instruction; and further, that the attention of school authorities be particularly directed towards this object.

As a result of this Report the Elementary Education (Blind and Deaf Children) Act, 1893, was passed.

In 1896 a Departmental Committee on Defective and Epileptic Children was appointed and in its report of 1898 dealt with the physically defective as well as the mentally defective and the epileptic. One of its main conclusions was :—

From the normal child down to the lowest idiot, there are all degrees of deficiency of mental power, and it is only a difference of degree which distinguishes the feeble-minded children, referred to in our inquiry, on the one side from the backward children who are found in every ordinary school, and, on the other side, from the children who are too deficient to receive proper benefit from any teaching which the school authorities can give.

The Committee called attention to the close association of the physically with the mentally defective, and in their Report stated that " a class of feeble-minded children is also a collection of children physically defective."

The age of seven was recommended as the minimum age for admission to special classes, and as regards admission,—

. . . four persons . . . should be present at the examination of children with a view to their admission to special classes, namely, the teacher of the school where the child has been, the medical officer of the School Authority, Her Majesty's Inspector, and the teacher of the special class ; and a fifth, namely, the parent, should be given an opportunity of being present. The medical officer should receive from the teacher presenting the child a form duly filled up, containing a statement of the child's attainments, and he, after conference with the two teachers, and the Inspector, should make his recommendation to the School Authority.

As to the age up to which attendance at school should be required, the Committee reported as follows :—

We think that all children may be kept in the classes till fourteen, and that their retention till sixteen should depend upon the decision of the Managers made upon the recommendation of the medical officer, and should be conditional upon the arrangements being suitable for the older children.

This Report led to the Bill which was ultimately passed as the Elementary Education (Defective and Epileptic Children) Act, 1899. This Act was permissive in character and by it defective children were defined as children who

not being imbecile and not merely dull and backward, are by reason of mental or physical defect incapable of receiving proper benefit from the instruction in the ordinary public elementary schools, but are not incapable, by reason of such defect, of receiving benefit from instruction in such special classes or schools as are in this Act mentioned.

A School Authority could deal with such children (1) by establishing special classes for them in some of its schools ; (2) by boarding them out in houses near to special classes or schools ; (3) by establishing either day or boarding special schools for them. Parents are bound to send their defective and epileptic children between seven and sixteen to special schools and classes to the same extent as they are bound to send their normal children to ordinary schools. In 1904 a Royal Commission on the Care and Control of Feeble-Minded was appointed " to consider the existing methods of dealing with idiots and epileptics and with imbecile, feeble-minded or defective persons not certified under the Lunacy Laws," and the scope of this reference was later enlarged. The Committee reported in 1908 and the general conclusions of the Commissioners are set forth in Paragraph 9 of their Report which runs as follows :—

" Of the gravity of the present state of things there is no doubt. The mass of facts that we have collected, the statements of our witnesses, and our own personal visits and investigations

compel the conclusion that there are numbers of mentally defective persons whose training is neglected, over whom no sufficient control is exercised, and whose wayward and irresponsible lives are productive of crime and misery, of much injury and mischief to themselves and to others, and of much continuous expenditure wasteful to the community and to individual families.

We find a local and 'permissive' system of public education which is available, here and there, for a limited section of mentally defective children, and which, even if it be useful during the years of training, is supplemented by no subsequent supervision and control, and is in consequence often misdirected and unserviceable. We find large numbers of persons who are committed to prisons for repeated offences, which being the manifestations of a permanent defect of mind, there is no hope of repressing, much less of stopping by short punitive sentences. We find lunatic asylums crowded with patients who do not require the careful hospital treatment that well-equipped asylums now afford, and who might be treated in many other ways more economically, and as efficiently. We find, also, at large in the population many mentally defective persons, adults, young persons and children, who are, some in one way, some in another, incapable of self-control, and who are therefore exposed to constant moral danger themselves, and become the source of lasting injury to the community.

In their discussion of what had been done since the passing of the Act of 1899 the Commissioners point out that up to September, 1906, it had been adopted by 87 Local Education Authorities. In the North of England there were 31 schools, of which 15 were in Lancashire, 5 of them in Liverpool. In Liverpool these five schools were opened in 1900, seven years before the institution of School Medical Inspection (1907), and medical work in connection with them was undertaken by specially appointed doctors.

The Commissioners made various important administrative recommendations which led to the introduction by the Government of a Mental Deficiency Bill in 1912, which was later withdrawn.

In 1913, however, an Act known as the Mental Deficiency Act (1913) was passed, to become operative from 1st April, 1914.

The definitions of the classes of persons brought within the scope of the Act were set out in Section 1, which ran as follows :—

The following classes of persons who are mentally defective shall be deemed to be defective within the meaning of this Act :—

(*a*) Idiots ; that is to say, persons so deeply defective in mind from birth or from an early age as to be unable to guard themselves against common physical dangers.

(*b*) Imbeciles ; that is to say, persons in whose case there exists from birth or from an early age mental defectiveness not amounting to idiocy, yet so pronounced that they are incapable of managing themselves or their affairs, or, in the case of children, of being taught to do so.

(*c*) Feeble-minded persons ; that is to say, persons in whose case there exists from birth or from an early age mental defectiveness, not amounting to imbecility, yet so pronounced that they require care, supervision and control for their own protection or for the protection of others, or, in the case of children, that they by reason of such defectiveness appear to be permanently incapable of receiving proper benefit from the instruction in ordinary schools.

(*d*) Moral Imbeciles ; that is to say, persons who from an early age display some permanent mental defect coupled with strong vicious or criminal propensities on which punishment has had little or no deterrent effect.

The Act further provided as follows :—

The duties of a local education authority shall include a duty to make arrangements, subject to the approval of the Board of Education :—

(*a*) For ascertaining what children within their area are defective children within the meaning of this Act ;

(*b*) For ascertaining which of such children are incapable by reason of mental defect of receiving benefit from instruction in special schools or classes;

(*c*) For notifying to the local authority under this Act, the names and addresses of defective children with respect to whom it is the duty of the local education authority to give notice under the provisions hereinbefore contained.

Along with the Mental Deficiency Act the Government in 1913 attempted to pass an Elementary Education (Defective and Epileptic Children) Bill, to make the Act of 1899 compulsory, and otherwise to bring it into conformity with the Mental Deficiency Act. This Bill was not carried, but in the next Session the Elementary Education (Defective and Epileptic Children) Act, 1914, was passed.

By this Act the Act of 1899 was made compulsory, so far as concerned mentally defective children. (The compulsory powers as regards physically defective children did not become operative until the Education Act of 1918.) The duty then devolved upon local Education Committees of making arrangements and submitting them for approval to the Board of Education for carrying out work under the two Acts.

The Board of Education issued model arrangements for the guidance of Education Committees in framing arrangements. These model arrangements treated the medical officer as practically the one effective instrument for carrying out the arrangements. The Liverpool Education Committee, however, modified the model arrangements so as to give a more prominent position to their educational advisors, and they definitely appointed a supervisor of defective children to act with the medical certifying officer, and gave specific recognition to this officer in their arrangements.

The certifying officer's form of report on each child examined for mental deficiency is of a very elaborate character and includes details of family history; physical, scholastic, mental and moral personal history; detailed physical examination; emotional, scholastic and intelligence reactions; diagnosis and disposal recommended.

In 1917 the Board of Education revised their "Regulations for Special Schools" and in a prefatory memorandum stated, "The Board recognise that during the war it would be inopportune to introduce into the Regulations any new requirements . . ."

In 1924 the Board of Education issued a circular to local education Authorities in which, after emphasising the need for full ascertainment of all cases of mental defectives in the locality, the value of securing the notification of suitable cases of children about to leave the Special School at 16 is recalled.

In 1927 the Mental Deficiency Act, 1927, was passed, and by it the definition of mental defectives became as follows:—

(*a*) Idiots; that is to say, persons in whose case there exists mental defectiveness of such a degree that they are unable to guard themselves against common physical dangers.

(*b*) Imbeciles; that is to say, persons in whose case there exists mental defectiveness which, though not amounting to idiocy, is yet so pronounced that they are incapable of managing themselves or their affairs, or, in the case of children, of being taught to do so.

(*c*) Feeble-minded persons; that is to say, persons in whose case there exists mental defectiveness which, though not amounting to imbecility, is yet so pronounced that they require care, supervision and control for their own protection or for the protection of others or, in the case of children, that they appear to be permanently incapable by reason of such defectiveness of receiving proper benefit from the instruction in ordinary schools.

(*d*) Moral defectives; that is to say, persons in whose case there exists mental defectiveness coupled with strongly vicious or criminal propensities and who require care, supervision and control for the protection of others.

For the purposes of this section 'Mental defectiveness' means a condition of arrested or incomplete development of mind existing before the age of 18 years, whether arising from inherent causes or induced by disease or injury.

Certain very important alterations from the 1913 Act are herein contained.

In 1913 all grades of mental defect are "from birth or from an early age," and it was always difficult to decide the limits of 'early age'; in 1927 the age is extended to 18 years and this greatly facilitates desirable action.

In 1913 under grade (*d*) the term was Moral Imbecile, and the final clause after the word 'propensities' read, "on which punishment has had little or no deterrent effect." In 1927 the term is changed to Moral Defective which is perhaps of particular value for some cases of post-encephalitis lethargica, and the criterion of reaction to punishment is done away with which facilitates preventive care.

In the case of feeble-minded children there remains the difficulty of decision as to what exactly is to be understood by "proper benefit from the instruction in ordinary schools."

Other important improvements embodied in the 1927 Act deal with supervision and after-care.*

Such in brief has been the legislative history of the development of Special Day Schools for Defective children.

Present Position and Practice.

What is the present position and practice?

In Liverpool, in addition to Special Day Schools for the Deaf and the Blind there are four Special Day Schools which are combined centres for a Physically Defective School and a Mentally Defective School, and one Special School which is a single one for the Mentally Defective.

The accommodation in these schools provides for 383 physically defective children and 608 mentally defective children, while the number of children on the school rolls is 477 physically defective and 766 mentally defective.

Liverpool is fortunate in having in its immediate vicinity various large Country Hospitals and Residential Schools, and so far as physically defective children are concerned full accommodation for day scholars is likely to exist so soon as the new Open Air Day School, now in preparation, is opened.

*For much of the foregoing I am indebted to a memorandum by Mr. Legge, late Director of Education, Liverpool.

But so far as feeble-minded children are concerned, not only are the Special Day Schools at present crowded, but many children already certified cannot gain admission, and the new Special School which is to be opened shortly for older boys will only partly meet the call.

The Certification of Physically Defective Children.

In his paper on " The Day Special School from the point of view of the Administrator " read at the Conference of the National Special Schools Union, November, 1927, Mr. Newton said, " It is a common experience of administrators to find that hospital and private doctors give medical certificates of unfitness to attend school in respect of children who could be admitted with benefit to special schools. The practitioners often give the certificates with a knowledge of the elementary school system only in their minds. If they can be supplied with a description of the special schools of the neighbourhood, and it can be explained to them how these schools are equipped for dealing with defective or ailing children, the doctors will be glad to have the information and will often advise parents to let their children have the benefit of special school education."

As a rule children are sent to the certifying officer with a view to admission to a special school by a school medical officer, health visitor, head teacher, and occasionally parents.

The main types of cases admitted are those of quiescent surgical tuberculosis, paralysis (flaccid and spastic), congenital deformities and the after effects of rickets. In some parts of the country the schools contain many cases of severe cardiac trouble (congenital and acquired), also cases of debility and some of epilepsy, asthma, etc.

Cases of trivial deformity, or those with a complaint rendering their attendance at school likely to be very irregular, are, however, often more advantageously retained at an ordinary school with special allowances when necessary.

Of 483 children in the Liverpool special schools in 1927, only 16 suffered from, and were admitted because of, rheumatic disease of the heart, and more of the serious cardiac cases could with advantage be admitted.

Some cases of congenital deformity and of spastic paralysis are obviously and certainly mentally defective, and if fitted for school education at all are naturally suitable for a school for mentally rather than physically defective children.

Other children of these types there are, whose mental capacity is hard to gauge, and in all such cases it is desirable that before admission to one or other type of school some index of mental power should be obtained.

Parents are sometimes very averse to having their children sent to a special school for physically defective children. They may see no reason why the child should not remain ' at his own school,' or they may positively object to sending him to ' a cripple school ' or ' a silly school ' These two latter

terms are specially liable to be vicariously used when schools are double centres that is to say, when under one roof there is both a school for physically defective and a school for mentally defective children, however separate they may be.

It certainly seems that some teachers in ordinary schools are unduly nervous of having control of children wearing surgical appliances, and the story of the child who was taken home by ambulance from the special school each afternoon, and yet each afternoon walked back to school and waved off the children going by a later ambulance is not without point.

Children certified as suitable for a school for physically defective children are taken to and from school by ambulance when necessary, and they get a good dinner in the middle of the day as well as extra nourishment at discretion

The Certification of Mentally Defective Children.

Children are recommended for examination by the certifying officer chiefly by school medical officers and head teachers, but also sometimes by Welfare workers or others, or at the request of the parents. Before such examination a full report is received from the head teacher regarding especially particulars of school attendance, scholastic attainments, and behaviour and disposition.

The child and his parent are then interviewed by a special officer who obtains full family, personal and domestic history, enquires into and observes personal and social functions and temperamental conditions, and finally obtains the child's intelligence quotient.

At some period thereafter the certifying officer examines the child in the presence of the Superintendent of Special Schools and of the parent, and having before him the reports of the head teacher, the school medical officer and the specially prepared form of information. His decision has to deal with the type or grade of mentality and the disposal of the child. He is here in the first place faced with a problem which includes not only decision as to the inherent mental capacity of the child but also the extent to which it can be developed in the particular scholastic environment in which he finds himself. This last is a markedly varying factor both in its intrinsic quality and in its human relationship.

It must, necessarily therefore, sometimes happen that a certifying officer cannot conscientiously after one examination make a final decision; and so with the borderline case, particularly in a young child, he sometimes gives a period of probation in the ordinary school, followed by a second examination and further report from the teacher.

(During 1927 I made a decision in 96 cases which I had placed on probation at ordinary Elementary Schools for periods of six months or longer. In 45 cases the decision was dull and backward, in 30 feeble-minded, in 4 physically defective, and in 17 probation was continued.)

While it is sometimes necessary to make use of probationary periods, it is advisable to do so as seldom as possible both for the sake of the individual and of the other scholars in the school in which he may be wrongly placed. As this is true of children who would be more fitly placed in special schools rather than in ordinary Elementary Schools, so is it equally true of children at the other

end of the special school grade who would be more fitly certified as imbecile, and thus do work at occupation centres. The younger the child is suitably placed the better are his prospects, and the better can be the work of teachers all round. In all borderline cases and in cases where evidence is conflicting, the results of the Binet Simon tests are of great value.

Parents often object to their child being sent to a school for Mentally Defective Children. If backwardness on the part of the child is admitted at all, it is thought to be due to " spite of the teacher," " neglect of the teacher," delayed development, laziness, " like his father or mother," or, particularly in the case of Roman Catholics, " too much religion."

There is often also resentment at the prospect of retention in school till 16 instead of 14, and this is particularly marked when children are only submitted to the certifying officer in their later school years. Delay in admission to a special school because of lack of accommodation often tends to increase this sense of resentment.

There can be no doubt however that, once admitted, the children with very few exceptions enjoy the life of a special school, and most parents quickly learn to appreciate its value.

The Work of the Special Day School.

Generally speaking the educational advantages for scholars are :—

(*a*) The pupils get more individual attention from the teachers than do the pupils in the ordinary Elementary schools, because the average size of a class in a special school is 25.

(*b*) The teachers are specially trained.

(*c*) Schemes of ' literary ' work are suited to the mental level of the pupils.

(*d*) More handwork is given than in the ordinary elementary schools, and this handwork leads to craftwork with a definite vocational tendency.

The curriculum set out in the " Special Regulations for Schools for Defective or Epileptic Children " by the Board of Education (1917) includes, *inter alia*:—

> (*d*) . . . (it) should be adapted to the special conditions under which the children are being taught, and the teaching of such subjects as Arithmetic and English (including Geography and History) should be connected as far as possible with the manual occupations of the children.

The manual instruction, while of a strictly educational character, should be practical and related to the school life and surroundings. This applies in particular to the needlework, and also to the woodwork and metalwork, which should be closely related to the needs of the school and of the garden.

Wide scope is granted for individual school curricula, and in Liverpool it is customary after religious instruction in the morning to occupy the forenoon with instruction mainly in reading, writing and arithmetic, and to devote the afternoon to manual work. This holds true both in the physical and in the mental schools.

All children in school are examined at least once a year by the certifying officer, and the year's scholastic progress is placed before him.

Sometimes it is found necessary to transfer a child from the physical to the mental school; occasionally a child in the mental school makes such unexpected progress that it is found possible to decertify it and allow it to return to the public elementary schoool. When a child is found after full trial to be unable to benefit from the school he is certified as an imbecile, and if the parents are willing is recommended for instruction in an occupation centre.

During attendance at school the special supervision and the presence of a nurse in the school facilitate regular or continuous attendance at out-patient department or surgery.

Even so it cannot, I think, be justifiably said that the control of long-continued treatment is satisfactory. We need much closer co-operation between whole-time official doctors and clinicians, and it is very desirable that the former should be granted time and opportunity to take a place on the staff of hospitals, and that the latter should be admitted and recompensed for official work. Treatment, except for quite trivial conditions, is not given at the schools.

After the age of fourteen some of the children become restless and anxious to leave school; in other cases the parents want them to commence work. The jurisdiction of the Education Committee extends till the age of sixteen, but in some cases permission to leave earlier cannot in practice be gainsaid if a definite offer of work is in hand.

On leaving school at the age of sixteen the children are automatically referred to after-care Committees or in the case of appropriate feeble-minded children to the Mental Welfare Association in connection with the Board of Control.

Apart from deaf and blind children there are certain other classes of cases which necessarily demand special consideration and of these three appear to stand out conspicuously—

1.—*Epileptic Cases.*

These cases can generally speaking be placed in one of four categories, namely, where the epileptic fits are consequent upon (1) birth trauma, (2) simple primary amentia, (3) infantile cerebral paralysis, or (4) cases of idiopathic epilepsy.

Pyknolepsy in my experience is very uncommon. I have only seen three cases.

The deciding factor as to the fitness or otherwise of an epileptic child as scholar at a day school, be it ordinary elementary, P.D., or M.D., special school, is the liability to severe diurnal fits. If the history is only of a few fits at long intervals, if the fits are only nocturnal, or if the fits are invariably preceded by unmistakeable symptoms, any type of school fitted to the child's mental condition may be permissible.

If the fits are severe, frequent, or diurnal, no form of day school is advisable.

But in a great many cases the type of school depends upon the presence or absence of long-continued and constant treatment. The 'leakage,' to use Sir George Newman's phrase, which occurs in the treatment of very many of them is deplorable. We agree that suitable education, and if possible ordinary education, is one of the most important needs of the epileptic child. But in many instances such education can only be obtained or continued if the child is under continuous medical treatment. Most of such children come sooner or later into the sphere of influence of the Special Schools Committee. They are defective children. As the Authority dealing with defective children, the Special Schools Committee is the natural link between, on the one hand, the preventive agencies of early childhood and the medical service of the ordinary elementary schools, and, on the other hand, with medical practitioners and hospitals. It occupies then from the medical standpoint an important central position. These epileptic children are among those who bring the Special Schools Committee into closest relationship with medical practitioners and hospitals. They cannot be satisfactorily educated unless such relationship is most intimate.

When children continue to have severe diurnal fits on full treatment, they are only suitable for a special Epileptic School, and such a school should be residential. Unfortunately it is common for institutions for educable epileptics to make feeble-mindedness a bar to entrance.

2.—*Post-encephalitic Cases.*

Under the terms of the Mental Deficiency Act (1927), the age of the causation of mental defect, "whether arising from inherent causes or induced by disease or injury," is extended to eighteen years.

Appropriate cases of encephalitis lethargica can therefore be included under it. But the so-called "character cases" are cases equally unsuited for a Special Day School as for an ordinary Elementary School, and yet many—for long, at least—are not certifiable as imbeciles. Some of these children have been given a period of probation in a special day school, with very unsatisfactory results. Some are now certifiable as moral defectives, but there is no means of special disposal of these children.

3.—*Rheumatic Cases.*

The treatment of active rheumatism and the prevention of permanent cardiac disease are accepted as matters of supervision and suitable hygiene for a prolonged period, a matter of years. To obtain this in very poor or unsatisfactory families, nothing short of a residential institution is of real avail.

If, on the other hand, the home is satisfactory, the mother intelligent and capable, and the child kept under regular and frequent supervision by a medical man, then in most cases the ordinary elementary school (with due precautions) is the most satisfactory school. If, however, the rheumatic child suffers from serious permanent cardiac disease, a Special Day school is often the greatest boon and pleasure.

The questions of corporal punishment for scholars in special day schools and the general control of the older children are matters of interest and difficulty. These children stay at school till they are sixteen, and some of them well before that time are in physique men and women.

I think we must all agree that for a healthy boy at the period of puberty, the daily school teacher should be a man and not a woman. For, particularly, the high-grade feeble-minded boy, a man teacher is still more necessary. It has not been my fortune to meet any body of women for whom my respect is higher than it is for the lady teachers in the special day schools, but I think their sex should in itself be a contra-indication for the duty of constantly teaching the older boys there. These youths should be under men, they should have some form of vocational training, and corporal punishment should not be entirely taboo. The high-grade feeble-minded boy is, as I have suggested, usually the most difficult type. Such a boy is sometimes not incapable of trading upon the fact that his naughtiness is treated with pity as being a sign of his feeble-mindedness.

A teacher in a special day school for feeble-minded children writes to me—

> Moral suasion is lost upon a certain class of these feeble-minded children—in fact they ridicule it and scorn it. . . . The policeman or detective is no object of fear in any of their homes, in fact, to use their own language they have 'done' him so often and hoodwinked him, that his appearance is part of a game for them. They hold the law and those officers who enforce it in derision. . . . Knowing that a visit to the Court means in the majority of cases a warning only, they become more and more daring. . . . If they were made to *feel* punishment, then this readiness to offend would soon lessen.

On the other hand many children physically weakly, though with a weakness of an inconspicuous nature, are the children who must appear 'naughty' very often to a tired, hard-worked teacher. These are the children who may receive punishment of various sorts, but these are just the children for whom corporal punishment is essentially bad.

A teacher dealing with physically defective children who previously had been in ordinary elementary schools writes to me—

> The results of caning seem so temporary that they don't seem worth while, even when they are not noticeably harmful. The children who are most often punished are (*a*) those who are quite unable to tackle anything like the work they should be doing without great mental distress, because they have lost all confidence in themselves, or (*b*) children are punished for talking in class (including "giving cheek") and these children are usually found to be either in too high or too low a class. . . . I think that those who use the cane think that those who don't must be soft in their treatment of the children. This is not so; I am sure the very first thing to do is to require a very high standard of work and behaviour from, first yourself, and then the children. The two reasons for caning given by most teachers of big boys are (1) cruelty, and (2) sexual offences. Anything less logical than caning as a cure for either of these could hardly be found. It seems to me that a sound and consistently up-held philosophy of life, including really high ideals, is the only cure worth having, and the best of it is, that when it is faithfully applied, it succeeds every time.

With the development of Country Hospitals for long-continued cases the importance of coincident education was at once recognised, and to-day in all good class hospitals such instruction is provided. If a child misses through illness one or more years of instruction at school, and at the end of this time

is fit to return to an ordinary school, it is of immense importance that he should be able to take his place with children not too much his juniors. Otherwise he passes into the category of the dull or backward, and for these at present no adequate provision exists. But with the development of schools in hospitals it has become possible to transmit with the leaver from hospital such scholastic information as will prove most valuable in placing him in a suitable class in school, or in pointing to the type of school desirable. Such a plan of action should be much more employed than it is, and would prove particularly valuable in orthopædic cases. The sphere of the orthopædist is to-day a very wide one, and we are sometimes told that he deals only with mentally normal children, or with children whose mentality is merely impaired because of their orthopædic disability, and which is restored *pari passu* with effective orthopædic treatment.

But experience goes to show that even prolonged and successful orthopædic treatment cannot compensate for damaged cerebral tissue, and that in many cases, children suffering from orthopædic defects are feeble-minded children. It is of extreme importance that such feeble-mindedness should be recognised and the child properly placed in school.

Practitioners and the medical and surgical staff of hospitals cannot to-day avoid responsibility with regard to the type of education for which their patients are suited. Such education is an important part of treatment.

In all cases the hope must be to fit the child for the ordinary elementary school, but if not so fitted the sooner the child is properly placed in a special school the better its prospects are.

Suitable scholars at special schools for physically and for mentally defective children must of necessity be those children who can only be classed as medical and surgical failures—at least temporarily. The main aims of the schools must then be two : first, humanitarian, to fit the individual for a suitable safe niche in life, however humble ; secondly, the protection of society, to keep unreliable or unsafe citizens under supervision or in segregation.

As regards the first I will quote two recent authorities—Davis (*What Shall the Public Schools do for the Feeble-Minded* ? Harvard University Press 1927), writes :—

> If the mentally subnormal individual is to enter into successful competition with normal individuals in either unskilled or semi-skilled labour, he must receive that type of training which will prepare him for such competition. By receiving this rather diversified type of preliminary training he is enabled to compete on equal terms in a particular type of work with the normal individual who has not had the opportunity of such instruction. . . . If we admit that by means of special school training, the mentally retarded child has received the requisite training whereby the skill and strength necessary to enter into some gainful pursuit have been acquired, even though he were so equipped, he could not hold any position for any length of time without having formed the habit of regularity. . . . After all, the primary object of prevocational training in the special school is the cultivation of an attitude of work—following directions, co-operation, dependableness, cheerfully sustained effort, and interest in the particular task. With these assets the defective child will be able to compete successfully with normal individuals and so become worth-while individuals in community life.

Miss Anderson (*Education of Defectives in the Public Schools*, Harrap & Co., Ltd., 1926), writes :—

> The aim of training the defective is to help him succeed in the work he is able to do—in other words, to enable him to get a job at unskilled work, to do the work well, and to know enough to keep it even if the work is not altogether pleasing.

With regard to the second aim—supervision—this should commence from the day of leaving school. Before leaving, in some schools children are tested for Social Efficiency, while in Report No. 33 of the Industrial Fatigue Research Board, entitled " A Study in Vocational Guidance " based on work carried out under the auspices of the Medical Research Council, a " psychographic scheme " is given (drawn up by Dr. Cyril Burt) which consists of a detailed schedule for investigating individual cases.

Mr. Newton (National Special Schools Conference, 1927) has said :—

> . . . the method of holding a " school leaving conference " towards the end of every school term will probably afford the best opportunity of gathering up all the information about " the golden lads and girls " who are at this stage of their lives inelegantly termed " leavers," and of placing these data at the disposal of the executive " work-seeker," be he the juvenile employment officer of the local education authority or an official of one of the Exchanges of the Ministry of Labour. In some places, the " leavers " with or without their parents, go to the juvenile employment office, or to the Exchange. This plan I believe to be much inferior, particularly for the discussion of the " first placing," to the plan of the official attending a school leaving conference held in the school building, when the " leavers " of the term, each with a parent especially invited (if possible personally invited by a Care Committee worker), can be seen in a succession of friendly interviews.

Without suitable after-care, without adequate supervision, much of the good of a special school is lost.

Most of these children require friendly help and guidance throughout life. The sphere of after-care work is so great that it is impossible as yet to deem it effectively carried out, and we have still to look forward to the time when this essential sequel to the work of the Special Day Schools will provide for the defective child his ' place in the sun.'